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Penny Plain

The Council of Ironfoundry Associations is busy stressing the importance of brightening up the aspect of foundries by the use of coloured pigments. There has been an extraordinary interest in this development, and no adverse criticism. Naturally, the question arises as to whether it will pay. We believe it will, as a good colour scheme will make the operatives take a greater pride in the machines; it should make for tidiness, and long personal observation enables us to state that profits increase directly with the degree of neatness imposed upon an industrial establishment. In initiating a colour scheme, foundry executives now have the co-operation of the British Colour Council. This should obviate the inclusion of " eyesores," and provide the necessary reflectivity and other desirable properties. As a prerequisite of the institution of a colour scheme, there will be a serious attempt to reduce dust, by installing suitable plant for its elimination at the points of generation. One North-of-England firm is now in process of colouring the whole of the interior of the works and other machinery, but it is leaving the foundry to the last. Probably it is the most difficult, yet surely it is the most urgent, and we ask that a reversal of policy should be immediately instituted.

One of the difficulties in ironfoundries is that where the soda-ash process is used, the fumes are somewhat corrosive. One firm of paint manufacturers has given special attention to this problem and has developed a satisfactory coating, but unfortunately this is a black pigment. However, with experience of colours replacing whitewash, research should supply materials of durability under the various conditions encountered in foundry practice. There is also to be considered the control possibilities of colour. It was, and is, extensively used in the steel trade to differentiate between the various alloy steels. The foundries could use it for apportioning loose plant such as barrows, moulding boxes, stillages and the like to fixed departments. This system will reduce maintenance costs, as plant reserved for a section instead of general usage will generally receive better treatment. Moreover, it is, for certain types of loose plant, an insurance against theft. The system would also indicate permanent requirements, as quite often there is the borrowing of a piece of plant by one department of a works from another, with a consequent waste of labour in fetching and returning. Store-keeping could also be facilitated by colouring bins and shelves relative to the place of consumption. The costing departments for years have made use of colour in their various control forms and these, too, might usefully be co-ordinated with the departmental colour scheme.

The engineering world in general will not make use of colour as it should do. Both here and in the States, much energy has been spent in standardising a colour scheme for patterns. Yet our information is that but few of the world's foundries utilise the standard colour scheme. As the foundry business is being internationalised, it would save future headaches if uniformity could be generally assured. If we assumed charge of a foundry, we would go beyond casting on essential reference data as to when made and by whom, but every casting leaving the shop would carry a coloured advertisement for the foundry, even though this would be quickly machined off.

AN ELECTRIC STATOR weighing 130 tons, built by C. A. Parsons & Company, Limited, of Newcastle-upon-Tyne, has completed its 270 miles' journey to Birmingham. The journey began on October 27; owing to the bulk of the equipment, the journey could only be carried out on Sundays under special arrangements made by the railway company.

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GERMAN BATH-MAKING

In our issue of October 17, page 169, we published a Report by Lt.-Col. R. L. Hunter on the "Production of Cast-iron Porcelain-enamelled Baths in Germany." Amongst the foundries described in the Report was Buderus'sche Eisenwerke. Another Report in the same series, by Mr. J. C. Richards (B.I.O.S. 818, Item No. 31), also carries a description of this works, and from it the following extract has been made.

Outer Mould

The cast-iron pattern, which is fixed to a vibrating table, was cleaned down by hand and compressed air and sprayed with naphtha. The outer box was then lowered onto an outer frame, which also rested on the vibrating table, the outer box being located by pins in the normal manner and was wedged in position. A small amount of new sand was hand-screened over the pattern, and the box was filled through shutes from the overhead sand preparation section. A light steel retaining box was previously placed on to the main moulding box to ensure sufficient sand to fill the mould after vibration. The mould was then vibrated for about 20 secs., and afterwards the light steel retaining box was removed and the mould rammed with pneumatic rammers. As the mould was to be poured from three points, three comb-shaped wooden patterns were placed in the set-up before the sand was filled into the mould. After ramming and hand finishing the top surface of the sand, these wooden combs were removed. The mould was provided with air vents in the normal manner. The top box was then unwedged and the outer frame was raised several inches hydraulically, following which a crane removed the mould onto a stand, and touching up work was carried out.

Core

A separate moulding machine was provided for the core or the inner section of the mould. This moulding machine had the usual vibrating table, and was equipped with a frame which could be elevated hydraulically and turned over by a small electric motor. A heavy bath-shaped cast-iron receptacle was placed on the table and a small amount of new sand was placed in the plug hole and overflow area. This receptacle was then a third filled with sand, and this sand was worked up the sides by hand. No naphtha was used on the surface of this receptacle. At this stage the top rim was brushed and wiped with an oily rag, and a core iron, which was of cellular construction, was lowered into position and clamped to the lower receptacle. A mild steel tray was placed in the central area of this core and a light steel retaining box placed on the top. Sufficient sand was then fed into the mould from overhead bins. The purpose of the mild steel tray was to direct as much sand as

(*Continued at foot of next column.*)

NICKEL INDUSTRY IN 1946

RAPID RECONVERSION ACHIEVED

Mr. R. C. Stanley, chairman and president of the International Nickel Company of Canada, Limited, has addressed a letter to shareholders in which he surveys the nickel industry in 1946. The outstanding feature of his review is the rapidity with which the company has been reconverted to post-war conditions, an achievement which owes much to long-established and comprehensive research activities in Britain, Canada and the U.S.A.

Operations in Canada are now running at 75 per cent. of the enlarged productive capacity, thus closely approximating the rate prevailing in 1937, when a record tonnage of nickel was sold. Despite increased costs of mining, smelting and refining, no price raise has been made, or is contemplated, apart from bringing the U.S. prices of nickel into line with the prices in the world market.

Thirty-five per cent. of the nickel consumed in the world is absorbed in stainless steels, which are likely to find increasing markets, particularly for industrial equipment. Plating accounted for more nickel during 1946 than in any previous year, showing an increase of over 50 per cent. on pre-war consumption, and, in America, there was a similar spectacular increase in the production of nickel silver.

Extended Applications

There are many new, revived, or extended applications for nickel-steels, nickel plate, cupro-nickel, and the company's well-known alloys, Monel and Inconel. These are now joined by the Nimonic series of alloys, originated and developed by the Mond Nickel Company, Limited, which, having made jet-propulsion in this country a practical possibility, continues to make a major contribution to our supremacy in this sphere.

Mr. Stanley stresses the commercial economies which have resulted from new applications for nickel, and, with industry more than ever aware of the importance of such economies, he considers that the outlook indicates expanding sales in the world markets for nickel.

(*Continued from previous column.*)

possible to the outer area of the mould. The mould was then vibrated for 10 to 20 secs., and two men with pneumatic rammers completed the compacting of the sand. The mould was then spiked to provide the necessary air vents. After finishing off the surface of the sand by hand, the mould was then lowered on to this trolley, and the receptacle, which was at this stage on the top, was unclamped from the core iron. The receptacle was then raised hydraulically and the core run out on the trolley for touching up as necessary. The core of the centre section of the mould remained on the trolley and the outer section of the mould lowered into position. From eight to 10 of the completed moulds were assembled on their trollies and were ready for casting.

CONTROL IN A MECHANISED JOBBING STEELFOUNDRY*

By D. BROWN†

When reference is made to a mechanised foundry one is inclined automatically to conjure up visions of tens of thousands, or even hundreds of thousands, off the one job. This Paper is intended to give a picture of a mechanised steelfoundry more or less on jobbing work, *i.e.*, 50's, 100's and 1,000's off, some of the difficulties peculiar to that process, and the methods used to eliminate or eradicate these difficulties.

First of all, it will be appreciated that the plant and tackle cannot be made to measure to the degree that it can be for a solely mass-production job and expensive jigs cannot be provided for all jobs. It is felt, therefore, that there is justification in referring to it as a jobbing foundry.

It is necessary to have a range of pattern plates but great consideration must be given to this matter bearing in mind the number of moulds per hour produced on the machines, the storage accommodation for moulds, the supply of metal, and the storage space for empty boxes. A sufficient number of boxes must be provided to keep the machines working to capacity, but not so many that the foundry becomes a storage depot. In this respect, it is a decided advantage to have the moulding machines fitted to accept more than one size of pattern plate, thereby allowing for the inevitable occasional breakdown.

In the foundry under review there are 10 moulding machines, six of which are normally used at one time; there are six different sizes of boxes which vary from 24 in. × 12 in. × 4 in. to 28 in. × 28 in. × 6 in.

The weight of castings produced varies from ¼ lb. to 2 cwt., and the average yield of castings from metal poured is 60 per cent. Fig. 1 shows a typical group of the castings made.

The production of the steel is by the cupola-converter process, two different types of steel being produced every day and sometimes three or four types. One heat of steel—approximately 30 cwt.—reaches the moulding shop every half hour.

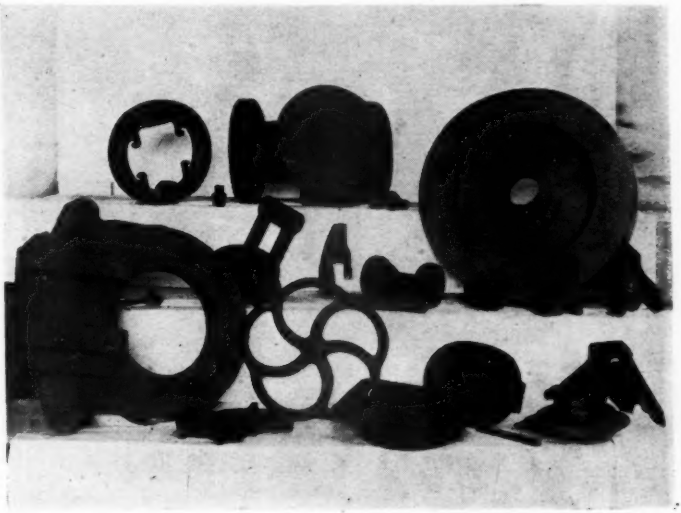

FIG. 1.—TYPICAL GROUP OF CASTINGS MADE.

Programme Planning

From the foregoing information a programme of work must be drawn up for each week; it is here that the problems in a jobbing mechanised foundry are so much greater than in a solely mass-production plant. The factors to be taken into consideration are:—(1) Promised delivery schedule; (2) number of moulds per hour from moulding machines; (3) weight of metal per hour to cast these moulds; (4) type of metal required to cast these moulds; (5) number of cores required and ability of core shop to supply these cores, and (6) conveyor storage space.

It will be obvious, therefore, that a balance of light and heavy work is necessary to give a proper total weight to keep the melting plant operating successfully and economically. A proper balance of type of metal required must be maintained, as, if only one job of 14 lb. per box requires metal of specification "X," 240 moulds would be necessary to use up 30 cwt. of steel and there would be neither boxes nor conveyor space to provide 240 moulds, not to mention the impossibility of attaining a temperature of metal sufficiently high to cast 240 boxes.

In times of overwhelming demand for steel castings as in wartime, much of this planning can be carried out in the original acceptance of orders, but in normal times the programme planning must begin in the foundry and can often be started before the pattern is even made, as, where one pattern for a job may

* A Paper presented to the Falkirk section of the Scottish branch of the Institute of British Foundrymen, Mr. W. Montgomery presiding.

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conveniently fit a smaller box, it may be wiser, due to commitments on that particular size of box, to make two patterns for a larger box. Even so, there are times when it is not possible to achieve the ideal balance of work.

Gating Design

On the acceptance of the order and before the pattern is made, the gating and feeding of the castings are decided upon, the important factors being:—(1) The soundness of the castings; (2) yield, and (3) ease of dressing. Of the three, the final soundness of the job is by far the most important. Standard practice is to manufacture a sample from each new job to check

FIG. 2.—CASTINGS WITH DIFFERENT TYPES OF RUNNERS AND RISERS.

the pattern and core boxes for cross joints, etc., and then to section the casting to check for soundness or else submit the sample to the customer for approval. If there be alternative ways of running and risering the job, which give an equivalent yield, the one which causes the least work and difficulty in the dressing shop is chosen. Some castings with different types of runners and risers are shown in Figs. 2 and 3. The decision is now taken as to what material of which to make the pattern. Generally speaking, wooden patterns suffice for medium quantities, but aluminium and brass patterns are made use of when large quantities are required.

Metal Production

The steel is produced by cupola-melted iron, treated in a tropenas converter and the melting plant is required to provide hot metal of controlled analysis according to the programme of the moulding shop. When the programme of work is balanced, this becomes a routine job requiring normal supervision and care, but when that balance cannot be achieved there are problems in store for the melting plant. In practice, the tendency is for the liquid metal requirements to fall below the correct production rate for the type of plant available. When this happens it is to a small degree overcome by starting to melt only at such time that the first heat of liquid steel reaches the moulding shop as the conveyor storage space is almost full. This gives the moulding department a small reserve which will gradually be reduced as the day goes on. When the metal required is still less it becomes necessary to allow a lag between each heat or at least between certain heats. This is undesirable, because it results in a drop in temperature in cupola, converter and ladles. This fall in temperature can be overcome to some extent by increasing the Si content of the iron from the cupola, thereby securing a greater temperature increase during the blow, and also a longer blowing time. This latter factor also helps in the spacing out of heats to the foundry. When a still greater delay is required by the moulding shop, it becomes necessary to alter the coke charge in the cupola as well as the analysis of the iron in order to achieve a high metal temperature. Another obvious method of keeping the output of steel at a reduced level but still extending it over the whole day, this latter factor being essential in mechanised production, is to reduce the melting rate of the cupola and the capacity of the converter by increasing the lining thickness.

The raw materials of the melting plant are under strict laboratory control, particularly as to sulphur and phosphorus. No reduction of phosphorus is possible in the steel-making process, but the sulphur in the cupola iron is drastically reduced by treatment of the molten iron by sodium carbonate. The iron is tapped on top of the soda ash—about 1½ lb. per cwt. of iron treated—and after a few minutes the metal is tipped as quickly as possible into another preheated ladle, thereby thoroughly mixing the slag with the iron. The reaction proceeds for a few minutes and then the slag is raked off. The two ladles are lined with chamotte and have a life of several months.

Analyses of the cupola metal are taken periodically as a further check on the raw materials and also on the cupola practice. The sulphur reductions attained are shown in Table I. The range of the iron composition is as follows:—0.8 to 1.0 per cent. Si; 0.6 to 1.0 per cent. Mn; 0.08 to 0.12 per cent. S, and 0.02 to 0.04 per cent. P.

TABLE I.—*Typical Sulphur Reductions in Iron used for Steel-making by the Converter.*

Blow No.	Desulphurisation	
	Before	After
1	0.110	0.053
2	0.094	0.044
3	0.085	0.039
4	0.083	0.039
5	0.078	0.035
6	0.085	0.040
7	0.091	0.041

The converter is of the type shown in Fig. 4. When iron of correct temperature and analysis is charged into the converter, the actual blowing is very simple and easily controlled. The normal blowing time is 12 to 15 min., and a final steel temperature of 1,620 deg. C. (approx.) attained, optical pyrometer reading. When the iron charged to the converter is below the desired temperature, a greater temperature increment can be attained during the blow by additions of ferro-silicon, giving a steel of high initial casting temperature. Care must be taken when adding the deoxidising, recarbonising and grain-control additions to make sure they are all properly melted and mixed through the bath. It is not possible to carry out any analysis of the finished steel until after it has been cast, so that all calculations and weighings must be accurately done. All heats are eventually analysed for the usual elements.

Maintenance of Furnace Linings

The maintenance of the furnace linings presents some problems and requires constant attention. The wear of the cupola walls is heavy, as is expected when melting 85 per cent. steel scrap in the charge and an entirely new lining is required every nine months. The converters are lined with a proprietary ramming material and give fairly satisfactory service. The original lining gives about 130 heats with no patching at all except for a very little to the nose to restore it to a proper shape. After this only the area immediately on and above the tuyeres is heavily worn and an area of about 3 ft. × 3 ft. is cut out and a new block of tuyeres rammed in, care being taken to have this block so wedged in, that it cannot fall out during the drying period. A converter so treated gives about 80 to 100 heats, and sometimes it is possible to ram in another block of tuyeres before the walls have worn thin. This procedure keeps the lining costs to a minimum. It is sometimes found that the bottom of the converter has worn badly, thereby materially increasing the capacity. This can be remedied after the day's cast by allowing the converter to cool to a dull red and hand-ramming in a layer of wet plastic material with a long rammer, allowing a few hours for this to dry and then firing with a hot coke fire. The converter may be used next day and usually gives good service. All new linings are rammed very hard in, thin layers well vented, and allowed a few days' air-drying before firing with coke.

Pouring the Metal

The transporting and casting of the liquid steel in a mechanised foundry requires careful thought. Hand-shanking is impractical since the moulds are on a conveyor 18 in. from the ground. Bottom pouring is unsuitable for such a large number of small boxes. Direct lip-pouring requires slag-free steel, and this allows a very serious loss of heat during casting. The chosen method is therefore the teapot type of ladle, where the metal is poured over the lip but is coming from the bottom of the ladle, and is therefore free from slag. There are two methods of forming the spout, one being inside the ladle and the other outside. In the first method a block of bricks and

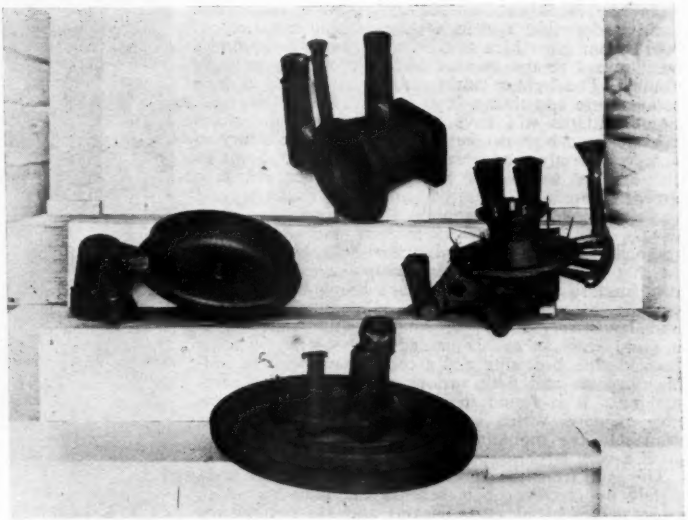

FIG. 3.—CASTINGS WITH DIFFERENT TYPES OF RUNNERS AND RISERS.

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rammed material is formed against the wall of the ladle with a hole down through the centre about 2½ in. dia., and a further hole at right angles to this 3 in. from the bottom of the ladle, running into the body of the ladle. After this is properly dried out the steel flows freely and cleanly through this runner and the same ladle can carry on a shuttle service all day. In the other method a box about 9 in. × 9 in. is fitted to the outside of the ladle and a hole cut through the ladle wall about 3 in. from the bottom. This box is lined to form a runner as before. The disadvantage of the teapot ladle lies in the fact that dull metal tends to freeze in the spout, and, should this happen, an attempt must be made to cast directly over the lip on the other side of the ladle. The efficiency of this type of pouring can be judged from a recent experience when 118 moulds were cast from 28 cwt. of steel in 38 mins. It is doubtful whether any of the other standard methods of pouring could have achieved this.

Sand Control

In any mechanised moulding system a single unit sand is desirable, and in a shop making a variety of work from ¼ in. thick to 6 in. thick, some compromise with regard to the various desired properties must be found. The lighter castings must be cast at a high temperature and thus a high refractoriness is essential. Some patterns will have intricate recesses and sharp corners, so a high degree of flowability is necessary to achieve a firmly- and evenly-rammed mould. Some of the castings will be of heavy section, hence a high green strength is required to avoid swelling, and sufficient cohesion is required to withstand the wash of the liquid metal when entering the mould. A reasonably simple sand mixture should be employed so that effective control may easily be exercised. In this foundry only two sands are brought in—Levenseat washed silica sand No. 3, of medium grain size, and Levenseat No. 2, of smaller grain size. This mixture gives an evenly graded sand system. This is bonded with bentonite and a cereal binder for moulding purposes and with various core binders for core-making. It is found in practice that the disintegration of cores which are made entirely from virgin sand into the moulding system is sufficient to make good a very large proportion of the losses.

The sand from the knock-out is carried away immediately by conveyor belt beneath the magnetic separator, thence by elevator buckets and *via* a vibratory screen, into a storage hopper. A rotary table at the bottom of this hopper distributes the sand to a conveyor belt leading to the mills. The binder additions are made as the sand is entering the mill and after the mill is full the required water is added. After milling for about 3 mins. the sand leaves the mill, into the aerator, and into the belt feeding the hoppers over the moulding machines.

It is necessary, due to the limited capacity of these hoppers, to share each millful of sand between about four machines. This emphasises the necessity of using only one sand mixture. By this continuous process the sand is used twice or three times daily, and this fact alone makes regular testing essential, as, unless immediately noticed, any wayward tendency can cause serious trouble in a short time.

The sand is, therefore, tested for moisture, green strength, permeability and shatter about 20 times daily; the grain size and clay content is checked every few days and all results are plotted on a graph which, in the event of any trouble with the sand or the skin of the casting, can sometimes give a clue to the cause of the trouble. It is found that quite a small decrease in green strength immediately gives trouble with

FIG. 4.—CONVERTER PLANT.

moulds breaking when stripping from the pattern, whilst a small increase in strength so decreases the flowability that moulds with soft corners result.

In this last respect a further check on the sand properties and also on the efficiency of the moulding machines is the application of the mould hardness tester to the face of the mould. Generally speaking, the harder the moulds are rammed the better is the casting, there being less chance of distortion of the casting, breaking of the mould corners, etc., and less chance of metal penetrating into the sand. Some

representative test figures are shown in Table II. This same sand, incidentally, has been used for casting grey iron and gives quite good results.

TABLE II.—*Properties of the Sand Used.*

Moisture	Green Strength	Permeability No.	Shatter
3.5	8.25	206	89
3.75	8.5	210	91
3.25	8.25	214	86
3.75	9.00	196	92
3.5	8.5	200	86

Mesh ..	22	30	44	60	72	100	150	Res.
Percentage	5·5	6.5	11.0	21.5	17.5	17.0	8.0	2.5

Core-making

The core-making is done entirely by female labour, and all the cores are hand-rammed. The fresh silica sand after drying is passed through a riddle into a chain of elevator buckets which carry it into a storage hopper built high above ground level. This hopper is fitted with a shutter measure which ensures accurate control of the sand mixing. The measured quality of sand falls directly into the mixer and the core compound is added from a pre-determined measure. By this means a core sand of consistent properties is guaranteed. The sand is fed by barrows directly into the hoppers over each core-maker's table.

By this method each table can be given a share of each mix, thereby ensuring a continuous supply of fresh sand. Passing all the tables is a continuously moving pendulum conveyor which carries away all the green cores on trays to the continuous gas-fired stove. The stove is fitted with a recording pyrometer which gives an accurate control of the core-drying. Immediately on leaving the stove the cores for the heavier work are painted with a non-siliceous paint, the heat in the core being sufficient to dry it.

Moulding

Probably the most notable feature of the moulding is that only female labour is employed. Every effort is made in the original planning of the job to have the core-setting made as foolproof as possible and the usual gauge roads, etc., are provided to ensure accurate wall thickness and boss diameters. The locating pins on the machines and also for closing are renewed as often as necessary to keep them fitting tightly. The sharp corners at the top and bottom of the ingate are rounded off and firmly pressed with a round wooden or metal plug to counteract any tendency of sand washed away during casting.

All the moulds are finally clamped before the locating pins are removed. Both wooden and metal plates can be used for transporting the moulds to the casting point, the wooden ones being the better, since they do not warp, but they are expensive to keep in supply since they burn easily when splashed during casting. The normal present-day feeding methods are employed as and when suitable. The moulds are all cast in the green state and no washes or dusting powders are ever employed.

After pouring, the moulds are knocked out whilst the castings are still red-hot and the sand is found to strip off the casting very easily. The burnt core completely disintegrates and the sand enters the moulding system.

The castings are allowed to cool to room temperature; then the area where the ingate and risers join the casting is shot-blasted to allow the oxy-acetylene burners to cut off the scrap. The casting now passes to the very important process of heat-treatment.

Heat-treatment

Efficient heat-treatment of a steel casting transforms a fairly brittle, highly stressed, into a strong, tough component able to take its place in any engineering construction. There is a fairly narrow margin of safety in most heat-treatment cycles, so that great care must be taken to get within that safety limit.

First, the correct temperature for the type or class of steel and the particular job and process must be ascertained, and, secondly, it must be affirmed that all the parts being treated have attained that temperature.

In the foundry in question the heat-treatment furnace is of the double-bogie type where one bogie is in the furnace being treated whilst the other is being unloaded and reloaded. By these means the maximum saving of heat is effected. The furnace is fitted with two pyrometers. One is the control instrument which operates the automatic stoker, thereby eliminating the human element, whilst the other is a recording instrument giving a permanent record of all heat-treatment cycles. The load on the bogey is kept to a strict limit to allow sufficient air passages between the castings to maintain an even heating and an even cooling. Similarly, the dampers on the furnace are adjusted carefully with the same end in view.

The normal heat-treatment for the types of steel manufactured in the foundry is a single straight normalising. This consists of heating the castings to temperature of 910 deg. C., soaking them at this temperature for 1 hr. per in. of section (which factor necessitates the segregation of the castings into loads of approximately equal thicknesses), and then air cooling in cold still air. The efficiency of the heat-treatment is judged from the test results obtained from test-pieces and the physical structure of the steel as seen under microscopical examination.

Inspection

In any foundry inspection is of great importance, but in a mechanised shop doing a wide variety of work this aspect of the work becomes vital. Inspection should begin in the core shop, go through the moulding, cleaning and dressing shops, right to the despatch. In the core and moulding departments a close watch is kept for any wear on core boxes or patterns which may cause a dimensional error in a whole run of a certain job. Every day, castings of the previous day's production must be examined for

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various types of fault. Crossjoints, for example, may be caused by a pattern having moved slightly by faulty closing technique, or even by a fault in a moulding machine. The cause must be investigated and corrected. At this point also a few representative castings should be sent to the surface table for careful checking up to ascertain any dimensional fault which is developing but which cannot readily be seen by visual examination. When the risers are being removed, a survey is made to see whether any castings have feeding pipes extending into the casting. The accumulation of the previous day's scrap castings is examined and, when possible, a report made out as to the cause of each rejection; by these means it soon becomes apparent if any single fault is recurring in a certain casting. Finally, all castings must be inspected before despatch. This inspection is comprehensive and covers dimensions, finish, appearance, etc. As far as dimensions are concerned, an approved checked sample can be used as the standard and some very simple jigs employed to check the main measurements.

Laboratory Function

The laboratory plays an important part in the smooth running of a mechanised foundry. It endeavours to prevent mistakes and troubles, and also tries to establish the reason why, should mistakes be represented by a lowering in quality. All raw materials are checked before use, and often a little careful segregation or dilution can overcome the possible injurious effect of some material being "off" specification. The finished steel is analysed each day, and any heat of doubtful quality can be withdrawn until further tests have been made. The control of the sand practice comes under the laboratory and the importance of this has already been stressed.

Specimens of the finished product are regularly examined under the microscope to check on the heat-treatment and the processing of the liquid metal. Only by a proper balance between the chemical analysis, heat-treatment and processing can consistently good test figures be achieved. Table III shows representative figures for the two main types of steel in everyday production.

TABLE III.—*Normal Tests from the Two Major Types of Steel Made*

Steel No. 1					Steel No. 2				
C	Si	Mn	S	P	C	Si	Mn	S	P
0.15	0.35	0.95	0.040	0.036	0.20	0.35	1.35	0.040	0.035
33 tons per sq. in tensile 18 tons per sq. in. yield point 35 per cent. elongation 60 per cent. red. of area 180 deg. N.F. bend 40 ft. lb. Izod					38 tons per sq. in. tensile 21 tons per sq. in. yield point 30 per cent elongation 50 per cent. red. of area 180 deg. N.F. bend 30 ft. lb. Izod				

Records

Accurate and up-to-date progress records must be kept and made readily available to everyone concerned. When it is remembered that one pair of moulding machines may be working on six different patterns in one day with different quantities off, and for different customers, it will be appreciated that a separate department is required for this task. Every mould produced has a code letter, or series of letters, stamped on it, representing the day on which it is made; for every heat of metal produced an accurate account of the moulds cast with it is kept; from this it is possible to trace the history of any casting, even after it has been despatched to a customer. In the case of a large order the records show up the average percentage of scrapped castings as compared with the moulds made, and it is then possible to make due allowance for this by casting, say, 105 per cent. of an order.

When a first order for a casting is received, a free-hand sketch is made of it, and the position and weight of the ingate and risers is marked on it. This forms a very useful permanent reference file in the event of a repeat order, even years later. All the main figures arising from the day-to-day records are kept in graph form, and it becomes fairly easy then to detect which jobs are paying best, which moulding machines are giving the best returns, and so on.

Although all these records are of value, it cannot be emphasised too strongly that a great deal of their value lies in their being right up to date at all times, so that no confusion can occur by different people taking different information because of a time lag in the records department.

Outstanding Features

In conclusion, the following are a few points which experience with this plant has brought to light:—The maintenance of a mechanised foundry is a factor of immense importance. The essential features of the process do not permit much of a reserve which can keep the foundry operating during a breakdown. Any fault in the sand-handling plant and very soon the moulding machines have no sand; any fault in the shot-blast or heat-treatment furnace and the flow of work into the dressing department ceases. If any of these breakdowns do occur, it is virtually impossible usefully to employ the idle labour, hence a great deal of expense is incurred in a short time.

Careful and continuous maintenance with an adequate stock of spares must be maintained. The gravity conveyor originally installed in this foundry at a time of grave national emergency was of a poor quality. This has been a constant source of trouble and all replacements are of a better quality product. It has been found that cement supporting blocks are much better suited to foundry conditions than the fabricated metal stands normally used with the gravity conveyor.

The power for the moulding machines, shot-blast and chipping hammers, is compressed air. This is an

(*Continued on page* 430, *foot of column* 2.)

INFLUENCE OF DESIGN AND PATTERN-MAKING ON FOUNDRY TECHNIQUE

Development of competitive methods of production of high-duty castings

By T. H. SNEDDON

(*Continued from page 396*)

"V" Cutter Castings

In the design of patterns for "V" cutter castings (see Fig. 13), the most suitable moulding box available is 24 in. x 18 in. internal dimensions. Therefore, six patterns are required to fill the box, each pattern being 11¼ in. x 3½ in. over the prints. To obtain a level joint, the core is completely covering the casting face and printed out on all sides. For feeding purposes, the full pattern requires to be moulded in the top-part, with risers dowelled in position. It is found, that to dowel each of the six patterns, is practically hopeless, so the six coreprints are made as one complete bottom board and the patterns screwed into position, thus making the six patterns one complete unit, which can be dowelled to the plate at 18-in. centres. As regards materials required for this assembly, the baseprint should, if possible, be made of hardwood, and, as for the remainder, only one yellow pine pattern made to double contraction with six aluminium, or other light metal castings, made from it, filed to a good finish and screwed to the hardwood print. The core box should also be made of hardwood and, if possible, metal faced round the top edges by strip steel, to resist the shock of ramming.

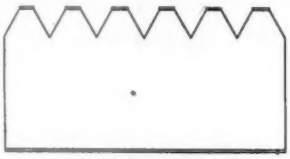

FIG. 13.—"V-CUTTER" CASTING.

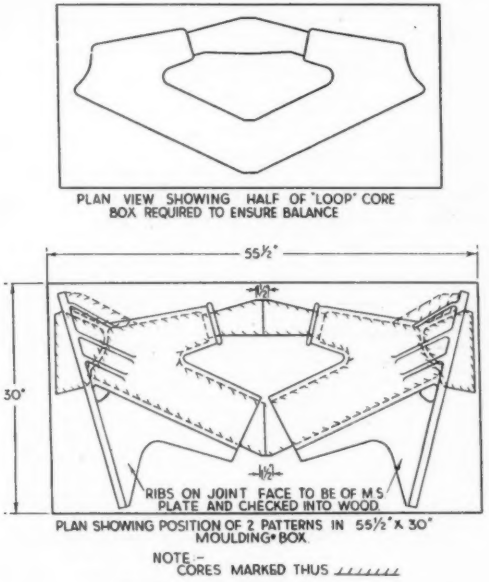
PLAN VIEW SHOWING HALF OF 'LOOP' CORE BOX REQUIRED TO ENSURE BALANCE
55½"
30"
RIBS ON JOINT FACE TO BE OF M.S. PLATE AND CHECKED INTO WOOD
PLAN SHOWING POSITION OF 2 PATTERNS IN 55½" X 30" MOULDING BOX
NOTE – CORES MARKED THUS

FIG. 14.—"BODY" CASTING.

Another pattern design is for "body" castings, which are, in shape, like an elbow bend with a rectangular flange connected to it and strengthened by the addition of several ribs, two of which are angled and require to be cored out (see Fig. 14). The flange is recessed and also requires to be cored out at this part. The

Design and Pattern-making

main core is the elbow bend, which has only two openings for prints and normally would require chaplets, to retain it in proper position. The moulding box decided on is 55½ in. x 30 in. internal dimensions and two patterns are required to fill this box. In splitting the patterns, it is found that a rib ½ in. thick is split in halves, and is necessary, therefore, to make the ribs of steel plate, which are checked into the joint wood of the pattern. The patterns are moulded, print to print, and, if possible, the two patterns should be made as one. This manner of moulding facilitates the use of a "hooped" core instead of the usual "elbow" core. A core of this type provides a balance when inserted in the mould and obviates the use of chaplets, the coreprints, when the mould is closed, being sufficient to retain the core in proper position. Nothing more can be said for this type of pattern design except that, from a cost point of view, half patterns and a half core box are only really required but, if supplied with full patterns split and two half core boxes, the foundry, in case of any damage to one half, can utilise the other until repairs are carried out.

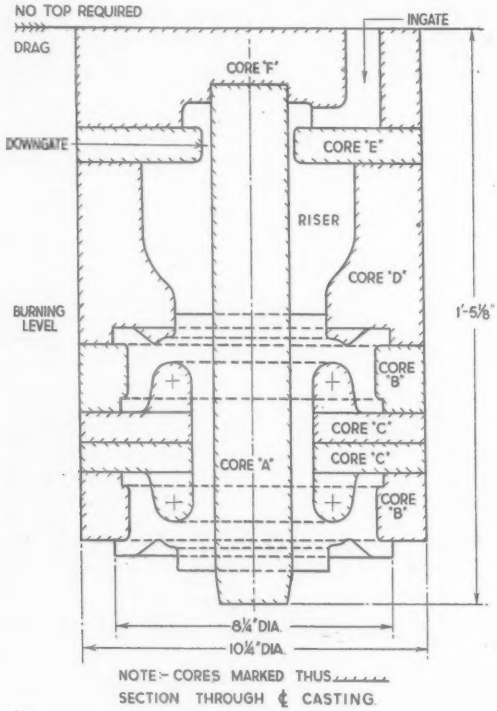

FIG. 15.—"ROLLER" CASTING.

"Roller" Casting

In the design of an intricate "roller" casting (see Fig. 15), which for feeding purposes has to be cast on end, a method 90 per cent. core assembly is carried out. The moulding box required for this pattern is 14 in. square and no top-part is required. Only one pattern is required and is very simply constructed, being mostly a round coreprint, with the bottom end shape of the casting and a centre coreprint on the end of it. In this block is the complete mould assembly and eight cores are required to completely close the mould. By splitting the core assembly into eight cores, it is only necessary to supply six core boxes A, B, C, D, E and F. One core is made out of each of boxes A, D, E and F, whilst two cores are made out of each of boxes B and C and are assembled as follows:—First, core A, which forms the bore shape, core B —the bottom flange shape, core C—the back face and recess behind the flange, core C (reversed)—for the same purpose at top flange, core B (reversed)—for the same purpose as bottom core B, core D—top shape of casting and riser, core E—ingate for top running system, and core F—containing runner, top

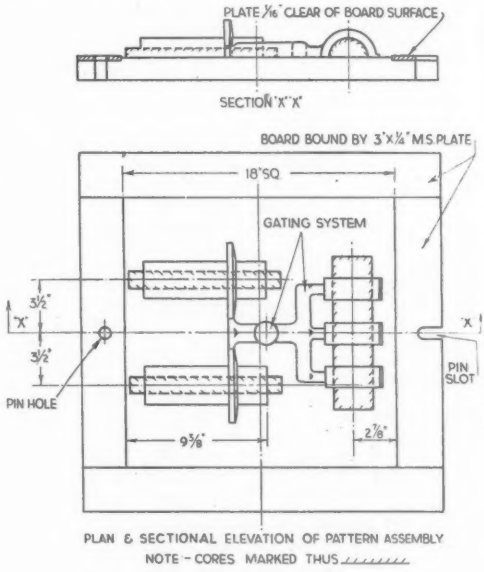

FIG. 16.—MANGANESE-STEEL BUSHES.

print for core A, and also is the cover core for the complete assembly. This appears to be a very long way of making the casting, but is really a cheaper method than splitting the pattern, definitely ensures a true casting which is not sided, and is also an excellent feeding proposition.

Manganese-steel Castings

On entering the last stages of the Paper the Author will deal with two types of manganese-steel castings made in large quantities. The first type is a set of bushes which comprises two flange bushes 8¾ in. long, and three plain bushes $\frac{7}{8}$ in. long (see Fig. 16). As they are required in sets, it is essential to keep them running through the foundry as such, and this demands that they be made in one moulding box. In doing this, it is first necessary to fix the moulding box size which in this case is 18 in. square, and make a thick wooden pattern board on to which the patterns and complete gating system are fixed. As the castings are perfectly symmetrical, half patterns only are required and are set on the board, with the two long bushes running in line with each other and the three short bushes (made as one pattern joined by a long coreprint), running at 90 deg. to them. The pattern board is plated on the top side by steel strips, which project $\frac{1}{16}$ in. above the level, to allow for the weight of moulding boxes gradually pressing them down level and also giving the desired sand to sand joint.

The second and last example is that of manganese-steel rings which weigh only a few pounds and require practically no feeding. It is impossible, in a jobbing foundry, to provide sufficient moulding boxes to obtain the required production, which is 300 to 400 per week. It is therefore essential to make them without boxes and the method to be explained is very simple and most economical (see Fig. 17). The castings are 5 in. outside diameter and ¼ in. deep. Four patterns are required, preferably of light metal, and two square, hardwood, metal-faced core boxes, one of which is 2½ in. deep, the other 2 in. deep. The patterns are set in the 2½-in. deep core box together with a downgate and four ingates. This method is named "stacking," and the core, from the 2-in. deep core box, is a plain block, which acts as a base for the assembly. The cores, containing the pattern shapes are stacked, shaped face downwards on top of this base until the stack is approximately 3 ft. high. A head box is applied and results in being able to cast 50 to 60 castings in one lot. The stacking method saves moulding boxes, sand, and, most of all, saves a great deal of floor space.

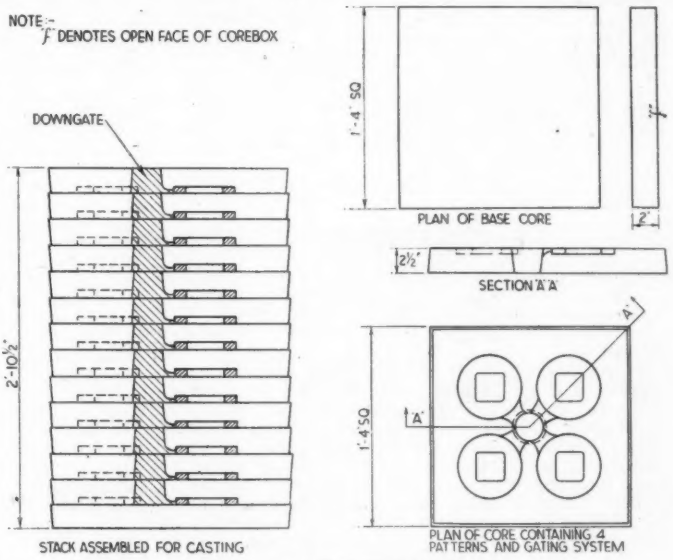

FIG. 17.—"MANGANESE RINGS."

Contraction Allowances

Although the designs discussed latterly have been for repetition patterns in a jobbing steelfoundry, they can be used, in fully mechanised foundries, to advantage. It should be stressed that, when a pattern design is made out, great care should be taken as to the contraction allowances made on the pattern. This point is sometimes forgotten and results in a pattern-maker providing a pattern made to full steel contraction when an allowance of something less should have been made, owing to the design of the casting. These differences in contraction are prevalent in castings which have many internal cores and, although the foundryman helps to prevent this by hollowing the cores, an allowance should be made on the pattern.

Finally, it has to be admitted that the pattern-maker provides the foundryman with an excellent piece of craftsmanship, although not always to the latter's entire satisfaction, but, if close co-operation is existing between both, excellent results can be obtained. This is coming more to light every day and, with new technical education schemes now proceeding, the young pattern-maker will not only be taught his own trade but also that of the moulder. It is expected, therefore, in the years to come, that he will not only view a pattern through the eyes of a pattern-maker, but also through those of a foundryman.

C.F.A. BULLETIN

The December issue of the Bulletin of the Council of Ironfoundry Associations opens with a Christmas message to the members from the chairman, Mr. Fitz-Herbert Wright. He points out that the rate of production of iron castings has now nearly attained the pre-war production of over 2½ million tons, and that the labour force has been increased by over 26,000. He announces that the C.F.A. will shortly be sending out to all ironfoundries a *questionnaire* which has to be returned to the Iron and Steel Board, in order to familiarise that body "with the present position as regards development in the ironfoundry industry."

The Bulletin includes a copy of a letter sent to the Ministry of Labour, pointing out the illogical basis of the proposed call-up of young men for the forces in 1947, in view of the forthcoming introduction of Italian labour. There is an article on the coke shortage, which has already had the effect of reducing output in some South-Eastern foundries. As this is due to the railway wagon shortage, and as a result of protests, top priority is now being given to this material and an early improvement should be noticed.

Finally, there is a note as to potential shortages of coal dust.

BOOK REVIEW

The National Insurance Act, 1946, by Douglas Potter, M.A., Barrister-at-Law. Published by Butterworth & Company (Publishers), Limited, Bell Yard, Temple Bar, London, W.C.2. Price 21s. 10d., post free.

It was wise to publish this book before the "appointed day," when the 1946 National Insurance Act comes into force, because its perusal will enable all classes to work out beforehand all the implications involved. That there are many implications can be gauged from the fact that it requires 270 closely printed pages for their disclosure and discussion. At the moment the most important section is dealt with in Part VII, "Transitional Provisions," as apparently these, for the time being, are the law of the land. The book is divided into two main sections—a general introduction to the Act, and the Act itself. There are three appendices, and a really comprehensive index.

The book is obviously an authoritative study of the subject, and as such will take its place as a standard work of reference in legal and business libraries.

DOUBLE ANNIVERSARY

The Christmas issue of "600," staff magazine of George Cohen, Sons & Company, Limited, and associated companies, celebrates a double anniversary. It is both the hundredth issue and the twenty-first birthday of the publication, which has a circulation of over 17,000 copies amongst employees and the many friends of the "600" Group. The current issue returns to normal format for the first time since the war and includes, as a new feature, a special staff supplement.

BRITISH COMMONWEALTH SCIENTIFIC CONFERENCE

The establishment of a British Commonwealth Scientific Office in London is one of the main recommendations to governments disclosed in the Report of Proceedings of the British Commonwealth Scientific Official Conference. (Published by H.M. Stationery Office, Kingsway, London, W.C.2. Price 1s. 3d.)

The Official Scientific Conference followed on the Royal Society's Empire Scientific Conference last July. Its primary concern was to discuss scientific collaboration, which had grown up in the Commonwealth during the war, and to devise means of ensuring its continuance and improvement. Consequently most of the resolutions are of an administrative or organisational aspect rather than of direct scientific interest.

Broadly, the proposal to set up a British Commonwealth Scientific Office (B.C.S.O.) in London is that the various Dominion Scientific Missions and liaison officers in London should occupy adjoining offices in the same building. While retaining full autonomy and responsibility to their governments they would be able to co-operate more easily in matters of common interest. Thus specialist knowledge which might at any time be available among the staff of one mission would be available to the other missions. The work would be carried out more rapidly and economically by the provision of certain common services such as library, typing, duplicating, abstracting, indexing and microfilming. It is suggested that the Department of Scientific and Industrial Research should be responsible for these common services, and that the B.C.S.O. London should at first be housed in the same building as D.S.I.R.

B.C.S.O., London, will be set up on approximately similar lines to B.C.S.O., Washington, which was established during the war. It is recommended that the latter should continue, but that its name should be altered to B.C.S.O., North America. The eventual establishment of B.C.S. Offices in other parts of the world is also forecast.

CONTROL IN A MECHANISED STEELFOUNDRY

(*Continued from page* 426.)

expensive item and the maintenance must take particular care with all joints and connections in the pipe line as a succession of small leaks can very soon cost much money.

On the welfare side there can be little doubt that a good ambulance room and canteen, also some brightening of the foundry working conditions by means of some bright paint, do have a beneficial effect on the spirit and results of the workers.

Acknowledgments

The Author expresses his appreciation of the help and encouragement given him by everyone concerned in the preparation of this Paper, and particularly Mr. D. W. L. Menzies, managing director of Bonnington Castings, Limited.

POWER TRUCKS FOR FOUNDRY USE

WORKING DETAILS OF A NEW MODEL

By F. H. SLADE

A foundry to be modern must be equipped with high-speed production machinery, associated with adequate servicing by a well-organised handling system. In this connection there is work for power trucks for transporting patterns; in the core room; for feeding the foundry floor with both moulding boxes and sand; for handling ladles of molten metal from the cupolas; for conveying castings from the foundry floor to the fettling shop and thence to the various processes, and to the despatch point. Any handling system should be so designed as to ensure that skilled or semi-skilled men are only concerned with carrying out the functions of their craft, whilst at the same time permitting that material movement is carried out in such a manner that the liability of delay is avoided and floor congestion eliminated. Handling is one of the biggest factors in the operation of a foundry plant, and offers the greatest scope for efficient cost reduction.

It is of interest to note that a weak link in the movement of materials often experienced in a modern foundry is in the core room, and the movement of cores up to the mechanical moulding plant, together with their setting and gauging. The use of power-trucks upon this work increases the elasticity of a plant, and likewise its productiveness.

In one case, power trucking applied to a core room which hitherto had been serviced by hand-trucks resulted in the release of six men to other duties, or where eight men had formerly been employed on hand-trucking, the same work was executed by two power trucks and two men. The duties on which these very appreciable savings were produced were in handling core racks from the core-making machines to the ovens, and from the baking ovens to the cooling floor.

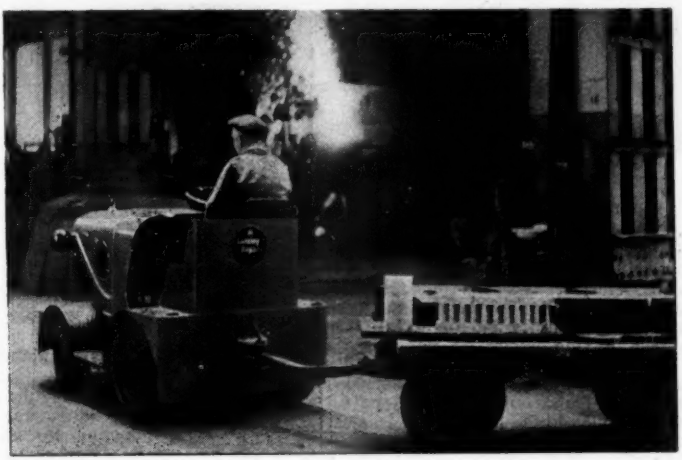

FIG. 1.—CORES BEING TRANSPORTED FROM THE CORE ROOM TO THE FOUNDRY BY TRACTOR AND TRAILERS.

Industrial Tractors

Power trucks, mainly of the Lansing Bagnall type, are used extensively in the foundry of K. & L. Steelfounders & Engineers, Limited, Letchworth. The entire plant is on one level, covering approximately 50 acres, which largely accounts for the preponderance of tractors, for under such conditions the tractor-trailer system generally yields the most ton-miles per brake horse-power.

In addition to the production of high-grade steel castings, approximately 130 tons per week for the open market, this plant is engaged upon the manufacture of Coborn petrol engines, Jones mobile cranes Browett Lindley steam engines and air compressors. Thus the tractors employed are used not only to service the foundry, but departments producing these subsidiary products. These duties, in the main, are as follows:—(1) Servicing the cupolas with coke, pig-iron and scrap; transportation of slag from the cupolas to yard dump; (2) maintaining the converter plant; (3) servicing of core room with sand, etc.; (4) servicing of foundry floor with cores and moulding boxes, and (5) transportation of castings to fettling shop and scrap from fettling shop to scrap yard. Movement of castings from fettling shop to locomotive and anvil shop, casting storage and casting despatch.

The system operated is that a definite number of tractors is assigned to manufacturing departments, each section being responsible for handling materials within that department, supplemented by others which are despatched from a central control, or transport section, when called upon for the handling of miscellaneous materials.

Two cupolas are in use, and the method of slag removal by tractor is that a short length of industrial rail is laid directly in front of the cupola, being connected by turntables and a short length of rail to the cupola. The tractor heads the skip under the cupola, the slag is drawn, and the full skip is moved manually to the turntable, from where it is moved by tractor to the dump.

Fig. 1 shows a tractor moving cores into the foundry, in which the easy attachment of the trailer to the tractor is well illustrated. Fig. 2 illustrates a tractor hauling two skips of steel scrap, headers and risers, from the fettling shop to the scrap yard.

Power Trucks for Foundry Use

Handling methods in individual foundries should be planned to suit the commodity being manufactured, and the plant layout; for example, the tractor and trailers system provides an extremely efficient method of handling materials when the haul is long, and it is not necessary to break bulk other than at the delivery point; alternatively, this method operates with equal efficiency when stage collection is resorted to, empty trailers are left in loading bays for loading on an outward journey and are added to a train of trailers drawn by the tractor on its return journey.

FIG. 2.—CONVEYING STEEL SCRAP FROM THE FETTLING SHOP TO THE SCRAP YARD.

Wherever possible, it is an advantage to develop trailers with a standard under-frame or chassis, mounting upon the chassis whatever type of superstructure is best suited to the materials to be carried. While for certain classes of materials a platform is needed, any alterations in the nature of the load can be met by using the same chassis, but with different superstructure, such as sides, banks or shelves, etc.

Easily Manœuvrable

The tractors illustrated are the new model "A" petrol-driven tractor manufactured by Lansing Bagnall, of Isleworth. This tractor is a post-war development, and many new features are incorporated, the general design being in accordance with the latest automotive practice. The ratio of load capacity to fuel consumption is high, and on account of its small dimensions, it can be manœuvred with ease within restricted and confined areas.

The trailing load on level concrete surface is of the order of 15 to 25 tons, the maximum drawbar pull being 2,500 lb. The speed at 2,000 r.p.m. of engine can attain 10 m.p.h., but can be geared down to ¼ a mile per hour. The wheelbase is 3 ft. 4 in., and the outside turning radius, 6 ft. 8 in. This tractor is designed for exceptionally heavy duty, long periods of service and ease of maintenance. The power unit is a 12/24 h.p. 4-cylinder Morris industrial petrol engine, developing a maximum brake horse-power of 26 at 2,400 r.p.m.

The engine speed is controlled by a Velocity type governor, which permits the maximum speed to be controlled from 1,400 to 2,000 r.p.m. On standard vehicles the governor is set and sealed for 1,600 r.p.m. maximum speed, at which the engine develops 20 b.h.p. The carburettor is a Solex governor thermo-starter model. Petrol consumption for normal working conditions is given as 3 pints per hour. Thermo-syphon cooling with a powerful fan and a large capacity radiator permit long periods of duty without undue heating.

The tractor is fitted with electric lighting equipment to permit working after dark, and on public roads. Combined side and head lamps are fitted as standards, with a tail lamp recessed in the bumper plate.

HOUSE ORGANS

Journal and Report of the Amalgamated Union of Foundry Workers. Published (for private circulation) by the Union from their offices at 164, Chorlton Road, Brooks Bar, Manchester, 16.

The October issue of this quarterly is outstanding, as it reports fully the details of the amalgamation of three unions into one. The new union possesses assets amounting to nearly half a million pounds, and a membership of nearly 63,000. Generally speaking, the presentation of matter follows the same lines as when this bulletin was the organ of the National Union of Foundry Workers.

Philips Technical Review, Vol. VIII, No. 6. Published by the Research Laboratory of N. V. Philips' Gloeilampenfabrieken, Eindhoven, Holland.

This particular issue contains but little of interest to foundrymen. There is, however, little doubt that from time to time this house organ will print material touching on foundry practice. The number under review has articles on contact arc welding; signalling in carrier telephony, and two articles dealing with medical subjects.

BRITISH CAST IRON RESEARCH ASSOCIATION

ANNUAL GENERAL MEETING

The annual general meeting of the British Cast Iron Research Association was held recently in London, with the PRESIDENT (Dr. Harold Hartley) in the chair.

Report and Accounts

The PRESIDENT said the gross income last year was £41,000, a little less than in the previous year. That was due to the fact that the sum received for additional work had decreased. It had grown during the war and was bound to fall off afterwards, but that decrease had been largely offset by the new basis of subscription and new members. Thus they had been able to keep the total income well up to previous years.

Referring to the report, he remarked that so much had been said at the luncheon about the work of the Association that there was little he need add now. He added that it was always necessary for research associations of this kind not only to carry out long-term research, but also to do other work which would provide a more or less immediate yield, if only to make everybody feel that the existence of the Association was justified. The Director had to keep a balance between the two things, and in order to give service to the members he must always have *ad hoc* work going on. He moved the adoption of the report and accounts.

MR. C. C. BOOTH, J.P., seconded, and expressed the hope that it would be possible to reopen the Foundry School soon, even if it were only in the form of a token school. A start on that could be made almost immediately. The report and accounts were then unanimously adopted, without discussion.

Election of President

MR. G. R. WEBSTER proposed that Dr. Harold Hartley be re-elected president of the Association, remarking that he had been a tower of strength to the Association for many years as chairman and more recently as president, since the untimely death of Mr. Pritchard. Dr. Hartley had recently received additional honours from the gas industry, with which he was so intimately connected, and he had helped the Association through many anxious times.

MR. J. J. SHEEHAN, B.Sc., who seconded, said that in Dr. Hartley they had a president who had such an incisive mind and form of expression that he had often wondered how he attained it. Was it natural or had he acquired it from his scientific training and attainments? Personally, he preferred to think it came from the president's scientific training because, having had a scientific training himself, he hoped, in time, to arrive at the same incisiveness of mind and expression. It was these attributes which made Dr. Hartley such an excellent president.

The proposition was adopted with hearty acclamation.

DR. HARTLEY, acknowledging his re-election, said he had rather regretted to-day not being chairman of the council, as he would have liked the honour of making the presentation to Mr. Pearce. Actually, he added, the president and council were marionettes. They were put into position by the Director who was behind the scenes and pulled the strings, and they all danced! Commenting on what he called the remarkable development which he had been able to announce at the luncheon, he said this had been carried out by their research staff under the direction of Mr. Pearce, and if Mr. Pearce had not thought of that work, they might not have been where they were. He paid a tribute to the work of the staff in this connection, and again thanked the members for re-electing him as president.

Election of Vice-presidents

On the motion of Mr. W. Todd, seconded by Mr. G. T. Lunt, the following vice-presidents, eligible for re-election in accordance with Article 23, were re-elected:—Mr. H. H. Berresford, Mr. V. W. Bone, Mr. R. J. Rogers, Mr. E. Player, Mr. J. Shaw, and Mr. G. A. Ure.

The PRESIDENT moved: "That in recognition of his long and faithful services to the industry and the Association, Mr. F. J. Cook be elected an honorary member."

MR. P. H. WILSON (chairman of council) seconded, and the motion was adopted with hearty acclamation.

MR. COOK briefly expressed his appreciation of the honour done him.

MR. J. F. STANIER moved: (*a*) "That the following members of council, retiring automatically under Article 27, and eligible for re-election, be re-elected: Mr. C. C. Booth, Mr. E. H. Colbeck, Mr. H. Field, Dr. J. E. Hurst, Mr. G. H. Johnson, Mr. G. T. Lunt, Mr. A. J. Richman, Mr. W. Thomas, Mr. W. Todd, and Prof. T. Turner," and (*b*) "that Mr. FitzHerbert Wright, co-opted during the year, be elected a member of the council, in accordance with Article 29."

MR. A. J. D. BLACK seconded, and the motion was carried unanimously.

On the motion of Mr. James Shaw, seconded by Mr. P. A. Abernethy, H. Overton, Salt & Company, chartered accountants, were elected auditors for the coming year.

The meeting closed with votes of thanks to the council and committees, the president and to the staff.

NOTES FROM THE BRANCHES

SOUTH AFRICAN.—The September meeting was held at the Theatre Hall, Johannesburg, with Colonel W. J. Grose presiding. The evening was devoted to the showing of a film entitled "A Vision Fulfilled," which depicts steel-making at the works of the Atlas Steel Company of Canada. Two representatives of the firm, Mr. Ray and Mr. Stokes, were available to answer questions. A number of students from the Johannesburg Technical College were present, and Mr. H. A. Godwin, their lecturer, expressed their thanks. Colonel Grose terminated the meeting with an expression of gratitude to the Atlas Steel Company and to their representatives for the showing of an exceptionally fine film.

PERSONAL

MR. ARTHUR PARKINSON has been appointed an executive director of Crompton Parkinson, Limited.

MR. J. W. L. SIMPSON has been appointed general manager of Robert Cort & Son, Limited, engineers and ironfounders, etc., of Reading.

SIR ANDREW R. DUNCAN, M.P., and MR. ROBERT L. ANGUS have been appointed directors of the North British Locomotive Company, Limited.

MR. HAROLD TRAFFORD has been appointed manager of the Manchester office of John Thompson Water Tube Boilers, Limited, Wolverhampton.

DR. C. F. BAREFORD has been appointed manager and head of the new Mullard electronics research laboratory at Cross Oak Lane, Salfords, near Horley, Surrey.

MR. H. E. ARBLASTER, B.Met.E., chief metallurgist of Stokes Foundries Pty., Limited, Albert Street, Brunswick, Melbourne, Australia, has just left this country for home. He has made an extended tour of Britain for the purpose of inspecting secondary industries. Mr. Arblaster was the author of a Paper presented on behalf of the Australian Institute of Foundrymen to the American Foundrymen's Association last spring.

COMMANDER C. J. HAWKES, formerly Professor of Engineering at King's College, Newcastle-upon-Tyne, has had conferred upon him by the Senate of Durham University the title of Professor Emeritus. He was on the staff of the Director of Dockyards at the Admiralty from 1907-8 and from 1910-20 he held a succession of posts at the Admiralty in connection with research. Prof. Hawkes is a past-president of the North-East Coast Institution of Engineers and Shipbuilders.

ACQUISITION OF UNWROUGHT COPPER AND ZINC

The Ministry of Supply has revised the licensing procedure for the acquisition of unwrought copper and zinc and copper wire rods. Applications for licences to acquire unwrought copper and zinc will in future only be granted if accompanied by the following signed declarations:—(1) We certify that the quantity requested on the accompanying application is needed to cover orders for our products, and that in the case of applications for virgin metal full allowance has been made for our expected intake of scrap. (2) We certify that, in respect of unwrought metal, our existing stocks, plus our outstanding purchases, plus the tonnage now being applied for will not exceed six months' consumption at our average monthly rate of consumption in September and October, 1946.

Applicants for licences to acquire hot-rolled copper wire rods are not required to furnish the second of the above declarations. The issue of a rod licence, however, does not guarantee that the holder will be able to place contracts against the licence, either with rod manufacturers or the Directorate of Non-ferrous Metals.

WOLFRAM PRODUCTION IN PORTUGAL

In his statement circulated with the annual report of Beralt Tin & Wolfram, Limited, Mr. F. Gates (chairman) says that the ban on wolfram production imposed by the Portuguese authorities in June, 1944, which was lifted in December, 1945, had been replaced by a new obligation, under which exporters of wolfram were required to purchase a ton of wolfram from stocks held by the Portuguese Government for every ton of their own material to be exported. Furthermore, since the stocks were of mixed quality and, for the most part, of comparatively low grade, it was difficult to dispose of them, especially when the problem was further complicated by foreign exchange restrictions. Circumstances still precluded the reopening of their mines, which remained throughout the year under review on a care and maintenance basis. About a month ago, however, it was found possible to get the wheels turning again. A contract had been concluded on satisfactory terms, which would absorb the company's production of wolfram for some months ahead and he hoped that it would now be possible to devote all their attention to productive operations.

GRINDING MAGNESIUM CASTINGS

The Minister of Labour and National Service has made regulations entitled the Magnesium (Grinding of Castings and Other Articles) Special Regulations, 1946, which provide for the safety of workers in factories, where the grinding or polishing of castings or other articles consisting wholly or mainly of magnesium and of alloys containing magnesium is carried on. These regulations reproduce with amendments the matters dealt with in the Magnesium (Grinding of Castings and Other Articles) Order, 1943, made under Regulation 60 of the Defence (General) Regulations, 1939, that Order being revoked by the new regulations, which, together with the revoking Order, come into force on January 27.

FIRE RESEARCH ORGANISATION

The launching of a combined offensive by science, industry, and the State to reduce the loss of national resources and assets by fire was announced by Sir Edward Appleton, secretary of the Department of Scientific and Industrial Research, last week. In conjunction with the Fire Offices' Committee, an association of fire insurance companies, his department was to establish a fire research organisation which would investigate methods of preventing and fighting fires, and conduct research on fire protection of buildings, aircraft, ships, and special industrial hazards. A new fire code was to be compiled from the recommendations of the joint committee on Fire Grading of Buildings, he said.

IN PARLIAMENT

Steel Sheet Allocations

COL. STODDART-SCOTT asked the Minister of Supply if he was aware that, whereas three-quarters of the total steel required was available for the next quarter and manufacturers of industrial equipment had only been allocated one-third of their requirements and, as such drastic cuts would necessitate the closing down of plant producing both home and export requirements, what steps was he taking in the matter.

Allocations of steel sheet for the first quarter of 1947 had been settled and authorisations had been or were being issued, said MR. WILMOT in reply. Steel sheet was at present in very short supply and the tonnage available was much less than the three-quarters of requirements to which Col. Stoddart-Scott referred. As regards other steels, final allocations were now being determined and some authorisations already issued would be supplemented. It was necessary to make special provision for vital programmes and the steel available for less essential production was correspondingly reduced. Every endeavour was, however, being made to maintain a reasonable balance of distribution and to avoid hardships.

Formation of Engineering Advisory Council

MR. JOHN WILMOT, Minister of Supply, announced in the House of Commons last week that, following discussions which he had had with the engineering employers and trade unions, he had decided to set up an Engineering Advisory Council to provide for him, in the discharge of his responsibilities for the engineering industry, a means of consultation with employers and workers in the industry on matters of general concern in the engineering field. Matters normally handled by the joint organisations of employers and trade unions in connection with wages and conditions of employment were excluded. The engineering industries for this purpose would comprise mechanical, electrical and radio engineering, but not shipbuilding or the iron and steel industry, which fell within the purview of the Iron and Steel Board. The Council would consist of equal numbers of trade union and employer members with himself as chairman. The names of members would be announced later. The Council would begin to function early in the New Year.

Steel Window Frames

In reply to MAJOR HAUGHTON, the MINISTER OF WORKS (Mr. Tomlinson) said that no contracts had been placed with firms of Dutch contractors for the manufacture of steel window frames. He would not deny that negotiations had been going on with Dutch constructors for the manufacture of steel windows from steel exported from this country.

PRATT, READ & COMPANY, INC., piano manufacturers, of Ivoryton, Conn., U.S.A., are using aluminium and magnesium for their pianos, instead of cast iron. This 40-year old firm has devised a "Uniplate" construction which combines the conventional wood back and iron plate. This method is said to reduce the finished weight by 150 lb.

SHIPBUILDING UNIONS APPROVE HOURS AGREEMENT

There was unanimous approval of the terms of the proposed agreement providing for a five-day week of 44 hours throughout the whole of the engineering industry, to come into operation on January 6, at a recent meeting of the Confederation of Shipbuilding and Engineering Trades Unions at York. The Amalgamated Engineering Union was admitted into membership of the Confederation, which is now a trade union organisation second only in size to the T.U.C.

No agreement was reached at the further discussions held in London last week between the Shipbuilding Employers' Federation and the Confederation of Shipbuilding and Engineering Unions on the unions' claim for a shorter working week in the shipbuilding and shiprepairing industries. The position will now be reported by both sides to the Minister of Labour.

BRITISH INSTITUTE OF MANAGEMENT

The President of the Board of Trade announced in the House of Commons that Mr. C. G. Renold, chairman of the Renold & Coventry Chain Company, Limited, had accepted his invitation to be the first chairman of the British Institute of Management. He hoped shortly to be able to announce the names of the members of the council.

The Institute of Management was set up on the recommendation of a committee of which Sir Clive Baillieu was chairman. It is designed to take the lead in promoting research into management problems, to raise the standards of management throughout the country, and to help in creating for industry and commerce a continuous supply of good managers. It is to have financial support from the Government for its first five years, but thereafter is expected to become self-supporting. The committee suggested that the institute should have the full support of individual firms, who should become corporate subscribers.

STROUD ENGINEER'S CENTENARY

T. H. & J. Daniels, Limited, mechanical and hydraulic engineers and ironfounders, of Stroud, entertained 200 guests at dinner at Cheltenham on Decemebr 11 in celebration of their centenary. The celebrations were delayed for six years on account of the war. Mr. J. Stuart Daniels, chairman of the company, joined the firm 58 years ago at the age of 14.

PLANS ARE BEING MADE for an exhibition of Sheffield workmanship to be held in 1948.

THE FOUNDRY OF Leyland Motors, Limited, at Farington, near Preston, Lancs, closed down on December 19 for a fortnight owing to the exhaustion of coke supplies due to the shortage of railway wagons.

NEWS IN BRIEF

E. & P. (ENGINEERING), LIMITED, is being wound up voluntarily. Mr. V. A. Nott, 52, Long Acre, London, W.C.2, is the liquidator.

WHITEFIELD METERS, LIMITED, is being wound up voluntarily. Mr. T. Dearden, 79, Mosley Street, Manchester, is the liquidator.

THE PITSEA ENGINEERING COMPANY, LIMITED, is being wound up voluntarily. Mr. V. Harris, Evelyn House, 62, Oxford Street, London, W.1, is the liquidator.

PROPOSALS TO INCREASE the capital of Head, Wrightson & Company, Limited, engineers and foundrymen, of Thornaby-on-Tees, are to be submitted to a special meeting on January 8. It is proposed to create 80,000 additional ordinary £1 shares, raising the capital to £710,000.

OWING TO LACK OF SUPPLIES of raw materials, short-time working has been started in the angle and plate mills and the steelworks of the Consett Iron Company, Limited. In future these sections will not work on Saturdays and Sundays. Shortage of steel ingots and coal is stated to be the main reason for the change.

THE TOTAL OUTPUT of Wear shipyards at Sunderland in 1946 is 40 ships, plus several tugs and lighters, totalling 195,629 tons gross, compared with 45 ships, of 217,840 tons gross, launched in 1945. The falling off in output this year can be attributed largely to delay in delivery of steel and fittings for completing vessels.

MR. W. J. WIGNEY, managing director of Darwins, Limited, at Sheffield, speaking at a staff dinner and dance of Darwins and Andrews Toledo, Limited, said that in the last few months he had been endeavouring to expand the company's ramifications in the East. If the negotiations succeeded, it would mean a large field of openings in high-level employment.

A LARGE SELECTION of good-quality, Government-owned, general-purpose machine tools declared surplus will be available at two additional selling depots which the Ministry of Supply is opening next month. The depots are at Stormy Down Airport, Pyle, near Bridgend, Glam (opening on January 8), and at Madingley Road, Cambridge (opening on January 22).

PLANS OF MODERNISATION, development, and expansion, most of which were already well in hand, were estimated to cost about £6,000,000, from which could be deducted E.P.T. refund, which on final settlement was expected to amount altogether to about £800,000, net, said Mr. I. A. R. Stedeford, chairman and managing director of Tube Investments, Limited, speaking at the recent annual meeting of the company.

HORDERN, MASON & EDWARDS, LIMITED, manufacturers of power presses and sheet-metal working machinery, of Birmingham, have been acquired by Cincinnati Milling Machines, Limited, also of Birmingham. Mr. W. G. Edwards, managing director of Hordern, Mason & Edwards, Limited, will be the chairman of the reconstituted board of the firm, on which two directors of Cincinnati Milling Machines will serve.

"THE PERIOD FOR DELIVERY of fabricated steel is getting longer; it is the same all over the country," said Sir Stafford Cripps, President of the Board of Trade, speaking at Newcastle-upon-Tyne after a tour of North-East trading estates. "We are trying to give factories in the development areas special treatment in supplies of steel, because we are very anxious they should not be held up any longer than is essential," he added.

WITH THE COMPLETION of a new pipe line between their Orgreave coke ovens and the Stocksbridge steelworks, the United Steel Companies, Limited, have reached a new stage in the development of the biggest private industrial gas grid in the country. The main, 13¼ miles long and 18 in. in diameter, is of all-welded steel construction. It conveys a direct supply of coke-oven gas and replaces the producer gas, which was previously used at the works.

THE MIDDLESBROUGH AND DISTRICT LOCAL EMPLOYMENT COMMITTEE are to make representations to the Ministry of Transport on the serious hold-up at the steelworks on Tees-side due to the shortage of railway wagons. The Committee are of the opinion that a change should be made in the priorities for southbound traffic and that the Ministry should be informed that, as Tees-side is an exporting centre, there should be an immediate revision of the wagon allocation.

"IF THE SHIPBUILDING INDUSTRY in this country is to lead the world as it has in the past, we must have a very much better co-operative spirit from the trade union leaders," Mr. John G. Stephen, a director of Alexander Stephen & Sons, Limited, Linthouse, Glasgow, said recently. Everything the shipbuilders did was hedged round and tied down by union demarcation lines and all sorts of rules and regulations, he said. "I have been trying for a year and a half to get two trade unions to agree to a new method; both agree it is an excellent thing, but I cannot get them to agree to co-operate."

THE BOARD OF TRADE announce that the continuance of the restrictions on the marking of metal containers and closures, as laid down in the Control of Containers and Packaging (No. 4) (General) Order, has recently been under review. It has not been found possible, however, to modify the restrictions at present, owing to the continued shortage of materials and labour in the industries concerned. The position will again be reviewed in the New Year. For the same reasons it has not been found possible to modify the restrictions as to types and sizes of metal containers for packing for the home market.

AT A MEETING held in London in connection with the recent formation of a World Engineering Conference, it was pointed out by the chairman, Mr. W. R. Howard, that other nations were forming similar committees, and the object of the meeting was to give the engineering and technical institutions in Great Britain an opportunity of considering whether British institutions would be represented in this international organisation or not. It was arranged to hold a further meeting on January 17, 1947, when it is hoped that representatives attend-

ing will be prepared to join the British National Committee with which to replace the present Provisional Committee.

DRAWING PRESSES which came from the Hanseatisches Kettenwerk at Hamburg with the first consignment of reparations from Germany, are to be used by a Royal Ordnance factory for experimental work to find possible alternative industrial applications. The chainworks was so well camouflaged and the activity carried on there so well concealed that it escaped damage throughout the war. Heavy machine tools for transshipment to Australia as the first delivery against the Australian share of reparations were included in the consignment. Some 1,000 tons of plant is now awaiting shipment at Hamburg, most of it heavy machine tools for the makers of steelworks plant.

WILDT & COMPANY, LIMITED, hosiery machinery builders, of Leicester, are offering 300,000 ordinary 5s. shares at 32s. each. In order to take advantage of the world-wide demand for hosiery machinery consequent upon the virtual suspension of manufacture during the war, the company have moved from their Tudor Road factory in Leicester to larger premises on the outskirts of the city, and have agreed to acquire for £400,000 (to be satisfied in ordinary capital of a nominal value of £63,000) the freehold factory and plant, etc., at Bookham, Surrey, of the business of Gillett, Stephen & Company, Limited, aircraft, hydraulic and general engineers, although the latter company retains the benefit of E.P.T. refund.

A STATEMENT MADE by Lord Greenwood at the recent annual meeting of Dorman, Long & Company, Limited, alleging that the *per capita* output in the company's constructional shops had been much reduced, has been challenged by the shop stewards. In reply thereto, a categorical reply has been issued by the company, which states: "In the years 1937, 1938 and 1939 the output from the constructional shops was 1 ton per man per week. Since the end of the war production on a similar class of work has fallen to half a ton per man per week, a decline of 50 per cent., and it is not showing the signs of recovery which could be expected had efforts for co-operation been successful. The shop stewards have repeatedly promised co-operation, but to be effective that co-operation must extend to every man in the shops. The records of production have been carefully maintained for very many years, and the fall in output is a definite and indisputable fact of which the shop stewards are fully aware."

Round Oak Steel Works—Profit for the year ended June 30, £170,441 (£184,893); provisions made in previous years now surplus, £16,000 (nil); interest and dividends, £2,277 (£3,623); to depreciation, £29,456 (£29,812); debenture interest, £14,541 (£14,800); debenture trustees' remuneration, £184 (same); staff pensions, £3,000 (£2,500); N.D.C., £7,700 (£7,500); directors' fees, £2,750 (same); over-provision for taxation in previous years, £19,500 (nil); to income-tax, £65,700 (£60,000); W.D.A., nil (£360); preference dividend, £3,150 (£3,000); to general reserve, £50,000 (£30,000); dividend of 8% (same); forward, £53,898 (£46,161).

OBITUARY

MR. DAVID KENNEDY, formerly general works manager of the Scottish Tube Company, Limited, died on December 10.

MR. JAMES SMITH BARROWMAN MITCHELL, a director of George Mitchell & Sons, Limited, ironfounders, of Bonnybridge, Stirlingshire, died on December 13.

MR. THOMAS MORISON, a director of Swan, Hunter & Wigham Richardson, Limited, and Barclay, Curle & Company, Limited, died at Cheltenham on December 16.

MR. GOTTLIEB WUTHRICH, general manager and chief engineer of Oerlikon, Limited, manufacturing electrical engineers, of Southampton Row, London, W.C.1, died on December 16, aged 67.

MR. STEPHEN SHEMWELL, a director and chief engineer of Plowright Bros., Limited, engineers and foundrymen, etc., of Chesterfield, died on December 9. He had been connected with the company for over 50 years. He was 70 years of age.

CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Chesterfield, January 7—Construction of approx. 400 yds. of 3 in. dia. spun-iron rising main, etc., for the Rural District Council. Mr. J. B. Wikeley, engineer and surveyor, Rural Council House, Saltergate, Chesterfield. (Fee £2 2s., returnable.)

London, S.W., January 8—Iron bars and iron castings, for the Wandsworth Borough Council. Mr. R. H. Jerman, town clerk, Municipal Buildings, Wandsworth, London, S.W.18.

Southampton, January 15—Cast-iron socket and spigot pipes, etc., for the County Council. Mr. A. C. Hughes, county surveyor, The Castle, Winchester, Hants.

"REMARKABLE PERFORMANCE" OF BRITISH SHIPBUILDERS

The shipbuilding industry was playing its part in restoring the strength and power of our merchant shipping, said Mr. Alfred Barnes, Minister of Transport, at Glasgow recently. In the quarter ended September 30, the shipbuilding industry launched 93 vessels, of 268,713 tons gross. That was a remarkable performance. It meant that during that quarter, the British shipbuilding industry turned out an average of one ship a day. There was now under construction a total of 464 merchant ships, of 1,874,000 tons gross. The Clyde was responsible for about one-third of the British tonnage under construction, Mr. Barnes added.

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Colburn Metal Products—£10,000. H. Colburn, 350, Wells Road, Bristol.

C.E. Engineering Company, 22, Charing Cross Road, London, W.C.2—£10,000.

P.R. Engineering Company, Grand Buildings, Trafalgar Square, London, W.C.2—£3,000.

Shaw Bros. (Ironfounders)—£7,500. W. Hildreth, 80, North Park Avenue, Leeds, subscriber.

Electric Boiling Plate—£7,000. T. E. Bowyer, 28, Grasmere Road, Barnehurst, Kent, subscriber.

Atlas Engineering Company (Northampton), 6, Brunswick Place, Northampton—£5,000. A. C. Cox.

Turner Automatic Machinery Company, Hapco Works, Bradford—£15,000. R. Turner and J. Hindle.

Basil Engineering Company, Basil Street, Leicester—£1,000. B. L. Watkins, M. J. Kelly and E. E. Reeves.

Home-Ease, 40, Willersey Road, Moseley, Birmingham—Engineers, etc. £1,000. J. H. Day and J. B. Mackay.

Pools Mobile Arc Welding Company, Harbour Terrace, Coal Dock, West Hartlepool—£2,000. W. A. and F. Alton.

Laidlaw Smith, 39, St. James's Street, London, S.W.1—Engineers, etc. £3,000. C. H. and M. E. S. Laidlaw Smith.

G. L. Andrews, 14, Grey Street, Newcastle-upon-Tyne, 1—General electrical engineers, etc. £4,000. G. L. Andrews.

Woodward & Company (Engineers), 5, Whitfield Street, Gloucester—£5,000. J. M. Hammond and G. H. Williams.

Hayes Profile Cutters, Springfield Road, Hayes, Mdx—£1,000. J. H. and M. M. Wynne-Morgan, and C. R. H. Howell.

D. G. M'Nair & Company, 583, Govan Road, Glasgow, S.W.1—General engineers, etc. £1,500. D. G. and M. H. M'Nair.

Downie & Trapp—Machinery and metal merchants, etc. £5,000. T. E. Bowyer, 28, Grasmere Road, Barnehurst, Kent, subscriber.

Torquil—Electro platers, tool manufacturers, engineers, etc. £10,000. M. Riches, 58, Margaret Street, London, W.1, subscriber.

B.C.W. Engineering Company, 9-11, Dormer Place, Leamington Spa—£1,000. W. H. J. Brock, T. H. G. Coleman and D. Wright.

Pervoi Engineering, 31, High Street North, Dunstable, Beds—£3,000. E. C. Gilbert, M. G. Corfield, P. L. Wilde, and A. Boutwood.

James Gill & Partners, Clock House, Arundel Street, London, W.C.2—Metal recoverers, etc. £1,000. J. Gill and A. I. Shepherd.

Hollybush Engineering Industries, 19-21, Hollybush Gardens, London, E.2—£5,000. W. J. Duff, E. G. Collins and W. H. Finch.

Blackwood Engineering Works, New Rock Foundry, Blackwood, Mon—£5,000. T., T. R. J. and R. T. Brown, and E. D. Laffan.

Harbrix Industries—Heating, general and mechanical engineers, etc. £5,500. J. P. Hardie, 10, Magazine Village, New Ferry, Ches.

Metro Engineering & Plating Works, Grange Works, Uxbridge Road, Hayes, Mdx—£4,000. C. F. Etheridge, J. Giles, and H. G. Ursell.

Iron Casement Company, 270, High Street, Waltham Cross, Herts.—General engineers. £2,500. W. G. Speller and G. B. Thorpe.

Litherland & Company (Metals), 102, Icknield Port Road, Birmingham, 16—£2,500. E. F. and C. M. Litherland and S. W. Brown.

Frank Malpass & Son, 23-25, Varney Street, Tunbridge Wells—General smiths and engineers, etc. £2,500. W. S. and M. Coate.

Ashley & Company, 19, Princes Road, Camden Town, London, N.W.1—Mechanical, electrical and general engineers, etc. £1,000.

Erifo—Ironfounders, steelmakers, etc. £15,000. S. D. Hutchison, 105, The Ridgeway, Chingford, London, E.4, and P. D. Pincott.

Apex Productions—Electrical and mechanical engineers, etc. £3,000. H. Baron, 32, Queen Victoria Street, London, E.C.4, subscriber.

Guy Morrison & Company, 22, Upper Grosvenor Street, London, W.1—Manufacturers of electrical and mechanical appliances, etc. £1,000.

Hydraulic & Mechanical Developments, 116, Victoria Street, London, S.W.1—£1,000. W. F. Hall, C. E. and G. J. E. Howard, and L. J. Oakleigh.

Angus Plant, Clock House, Arundel Street, London, W.C.2—Manufacturers of mechanical excavators, etc. £1,000. A. I. Shepherd, W. J. Carnegie, and J. Gill.

Stefram, 37, Bloom Street, Manchester, 1—Manufacturers of frame constructions in steel and other metals, etc. £2,000. J. Cooper and E. M. Mather.

Begwaco Meters, Bridgewater House, 60, Whitworth Street, Manchester—£250,000. F., H. T., and F. M. Thorp, E. Butterworth, W. M. Carr, and W. Hodkinson.

Russells of Edinburgh (1946), 108, West Row, Edinburgh—Manufacturers of agricultural and horticultural machinery. £12,000. M. Russell and D. J. Robertson.

Adcola Products, Alliance House, Caxton Street, London, S.W.1—Ironmasters, founders, etc. £1,000. I. M. A. Adamson, E. M. Cosmelli, and M. C. Lamb.

Vaughan & Williams, 7-8, St. George's Terrace, Brearley Street, Birmingham, 19—Mechanical and general engineers, etc. £5,000. L. Massey and J. E. H. Widall.

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COMPANY RESULTS

(Figures for previous year in brackets.)

Fuller's Earth Union—Interim dividend of 4% (same).

Butterley Company—Interim dividend of 3½% (same).

John Holroyd & Company—Dividend of 20% (same).

Johnson, Matthey & Company—Interim dividend of 3% (same).

Dunswart Iron & Steel Works—Final dividend of 6% (same).

Birmingham Small Arms Company—Dividend of 7½% (same).

Aerialite—Final dividend of 45% (12½%), making 55% (22½%).

Power-Gas Corporation—Dividend of 12½% (10%) and bonus of 2½%.

English Clays Lovering Pochin & Company—Dividend of 5% (3½%).

Rotherham Forge & Rolling Mills Company—Interim dividend of 5% (same).

C. Lindley & Company—Final dividend of 15% on increased capital, making 25% (same).

Head, Wrightson & Company—Interim dividend of 3% (2½%); the increase does not indicate larger total for the year.

Associated Clay Industries—Dividend on the 7½% cumulative preference shares for the four years to December 31, 1943.

British Rola—Net profit for the year ended March 31, £62,718 (£62,767); dividend of 15% (same); forward, £1,120 (£2,105).

S. Noton—Final dividend of 4% (same) and bonus of 2½% (nil) on the 5% participating preferred shares, making 10½% (8%); dividend of 20% (same) and bonus of 25½% (nil) on the deferred shares.

Burt, Boulton & Haywood—Net profit for the year ended June 30, £32,870 (£28,662); to reserves, £10,000 (same); preference dividends, £5,512 (£5,250); final dividend of 3%, making 5% (same); forward, £22,086 (£19,416).

Birmid Industries—Net profit for the year ended October 31, £128,218 (£124,978); dividend of 10% and bonus of 10% (same); to general reserve, £50,000 (same); dividend reserve, nil (£50,000); forward, £57,669 (£54,801).

General Cable Manufacturing Company—Profit to September 30, after depreciation, etc., £103,616 (£76,383); to tax, £74,186 (£50,421); deferred repairs, nil (£9,000); reserve, £10,000 (nil); final dividend of 17%, making 25% (15%); forward, £4,312 (£4,132).

S. Smith & Sons (England)—Net profit for the year ended August 3, £130,395 (£116,568); to reserve for research, etc., £20,000 (£30,000); final dividend on the preferred ordinary shares of 10½%, making 17½% (same); dividend on the deferred shares of 37½% (same); forward, £101,949 (£83,831).

Cleveland Bridge & Engineering Company—Profit for the year ended September 30, before providing for taxation, deferred repairs and depreciation, £119,839 (£85,556); net profit, £25,296 (£16,278); final dividend of 5%, making 6½% (5%), tax free; to general reserve, £4,000 (nil); forward, £6,954 (£6,013).

Mann, Egerton & Company—Profit to September 30, after providing for deferred repairs of fixed assets and tax, £29,554 (£131,595); to general reserve, £5,000 (£2,500); to dividend equalisation reserve, £5,000 (nil); provision for supplementary pensions, £2,500 (nil); dividend of 30% (15%); forward, £26,754 (£24,822).

Richard Hill & Company—Trading profit for the year ended September 30, £40,780 (£23,319); to depreciation, £9,879 (£9,971); obsolescence, £329 (£515); write down fixed assets, £10,000 (same); directors' fees, £500 (same); taxation, £16,000 (£6,000); final dividend of 5%, making 8% (6%); forward, £18,408 (£21,761).

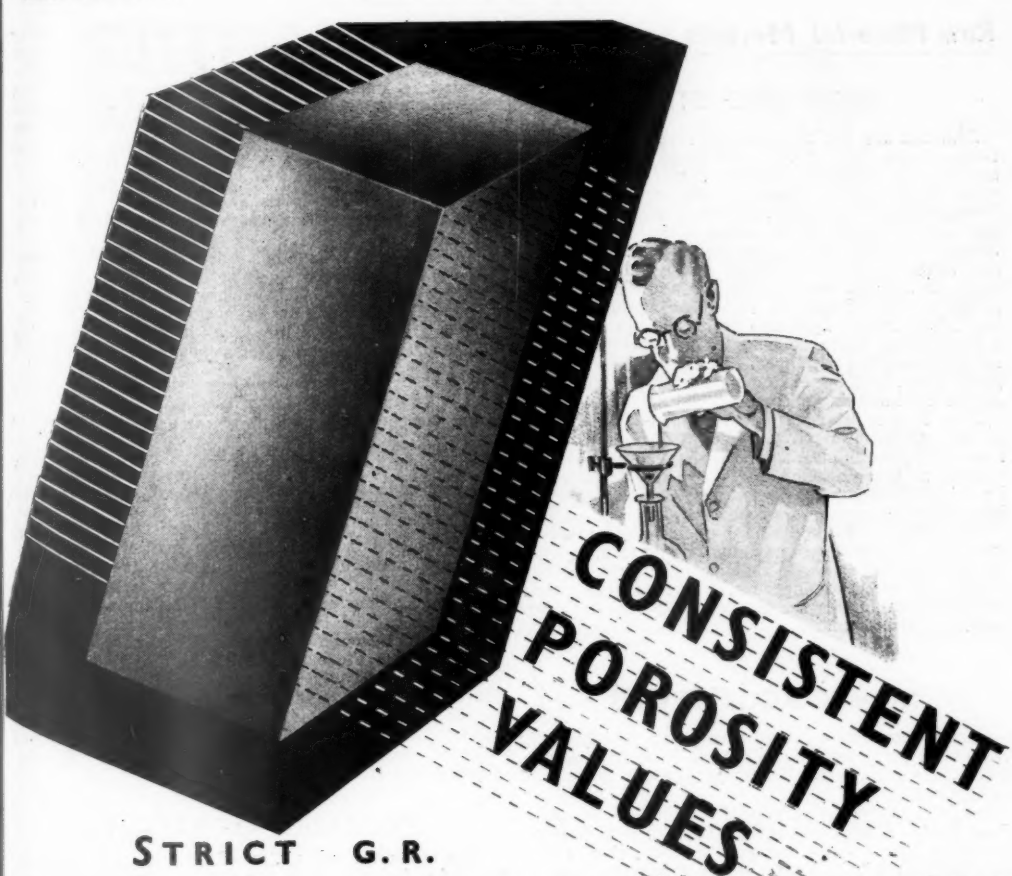
Beralt Tin & Wolfram—Credit balance for the year ended March 31, after taking into account £80,000 for E.P.T. recoverable, etc., and writing off the balance of the investment in the subsidiary company, £27,109 (£59,701); taxation, £9,500 (£21,000); dividend of 10% (same) and bonus of 5% (nil); forward, £29,884 (£39,583).

Wailes Dove Bitumastic—Net profit for the year ended September 30, after tax, depreciation, etc., £27,781 (£21,083); transfer from provision for foreign debts, etc., £2,000 (same); final dividend of 15%, making 20% (15%); to general reserve, nil (£10,000); written off goodwill, patents, trade marks, £10,000 (nil); forward, £11,414 (£10,883).

J. Brockhouse & Company—Net profit for the year ended September 30, after providing for tax, £107,936 (£142,568); dividends on preference stock, £788 (£750); interim ordinary dividend of 7½%, £37,013 (£33,649); final dividend on ordinary shares of 12½%, £62,033 (£56,081); to expenses re new capital, £6,227 net (nil); superannuation, nil (£25,000); forward, £202,909 (£201,034).

Crompton Parkinson—Trading profit and sundry income for the year ended September 30, after providing for E.P.T., income tax and contingencies, £468,328 (£462,533); depreciation, £25,000 (same); directors' fees, £2,965 (£3,250); net profit, £440,363 (£434,283); final dividend of 7½%, making 15% (same) and bonus of 7½% (same); forward, £797,902 (£690,039).

Imperial Smelting Corporation — Consolidated balance-sheet of subsidiary companies for the year ended June 30 shows a gross trading profit of £617,005 (£562,413); sundry income, £30,398 (£28,940); to depreciation, £147,298 (£116,306); deferred repairs, £80,426 (£25,327); taxation, £163,225 (£207,461); subsidiaries distribution in interest and dividends to the corporation, £154,310 net (£146,700 net); gross income of the parent company, £292,047 (£297,571); net profit of the parent company, £150,086 (£119,548).



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Raw Material Markets

IRON AND STEEL

Although the call for pig-iron, both for the production of light castings and also from the engineering and jobbing foundries, continues to increase, no serious shortage of supplies has yet developed. All the foundries have hitherto been able to carry on without interruption, but nowhere, either at the blast furnaces or the consumers' works, are any large stocks visible, and there are elements of risk in the industry's complete dependence on the regular flow of pig-iron supplies. The position in regard to high-phosphorus iron is particularly tight, and during the last few weeks a much more active demand for low-phosphorus and hematite iron has developed. Refined iron is the only grade which remains on the export list, and not much of this is now going abroad.

From light mills engaged on sections and small bars, as well as from the wire works, which are said to have about six months' work in hand, there has developed an eager demand for billets. Home deliveries have increased, but not to the desired extent, and the lack of American supplies is severely felt.

All classes of finished steel products are wanted in tonnages far exceeding maximum production. Even special steel, which was a dull market in the summer months, is now attracting considerable attention, while sheet and plate mills are booked up for at least six months ahead.

NON-FERROUS METALS

Copper consumers' requirements are fairly well covered at the present time, but the forward position, particularly for electro, would not appear to be too satisfactory.

Speaking at the recent annual meeting of Nchanga Consolidated Copper Mines, Limited, Mr. S. S. Taylor, managing director, said that since the beginning of the calendar year they had suffered in company with other Rhodesian producers from short supplies of coal. In consequence they had had to shut down operations for short periods in order to allow supplies of coal to acccumulate, so that they could recommence production. Unless they could obtain better deliveries from the railways or substantial deliveries from outside they might still have to face short periodical shut-downs until the railway position improved.

World tin production for the current year is estimated at 94,000 tons, according to details published in the Statistical Bulletin of the International Tin Research and Development Council. Apparent consumption is estimated at 125,000 tons. In this respect it is of interest to note that at its meeting in October last the London Tin Conference stated that world tin consumption for 1946 was estimated at 137,000 tons.

Supplies of lead continue to be very tight, with no sign of any early change for the better. In announcing that the price of lead for New York delivery had been increased from 11.80 cents to 12.55 cents per lb., the American Smelting & Refining Company explains that the rise in the world market had necessitated a domestic price increase. Foreign lead was selling at the equivalent of 11 cents, Gulf of Mexico ports, and domestic consumers had been buying from foreign exporters at that price. The difference between 11 cents at Gulf of Mexico ports and 12.55 cents New York was due to transportation costs and U.S. import duty of 1.06¼ cents.

American and Canadian interests are to build near Arvida, in the Lake St. John district, a zinc refinery costing over $11,000,000, which will permit the Province of Quebec to produce its own sulphur and other chemicals extracted from zinc instead of importing them from the United States as at present.

EXTENSION OF TOKEN IMPORTS SCHEME

Machine knives, paper machine wires, woven wire cloth, gauze, fabric or meshing, gear transmissions and gears, pipe joints of non-malleable cast iron, and pipe joints of iron or steel, excluding malleable cast iron and non-malleable cast iron, are among the latest list of permitted goods which are to be allowed into the United Kingdom under the token imports scheme. Until the end of 1946 the individual overseas manufacturer will be able to ship to this country the goods in this list to the extent of one-half of the quota of 20 per cent. for the calendar year, *i.e.*. 10 per cent. by value of his average annual pre-war trade in these goods with the United Kingdom. The token import scheme covers the following countries:—Canada, U.S.A., Belgium, Switzerland, Denmark, France, Sweden and Holland.

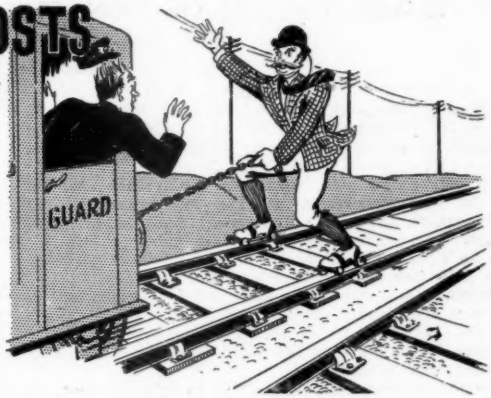
EXCHANGE OF PATENTS

The exchange of copies of patents with foreign countries, interrupted by the war, is being resumed as rapidly as possible in compliance with international conventions designed to stimulate industry and trade and promote scientific progress. Prior to the war, the various countries regularly exchanged copies of patents with 16 others: Australia, Austria, Belgium, Canada, Czechoslovakia, Denmark, France, Germany, Great Britain, Hungary, Japan, Mexico, the Netherlands, Norway, Poland, Sweden, and the United States. Exchange agreements have now been resumed with all of the countries formerly on the list except Hungary and Japan, and two new nations have been added, Switzerland and Finland.

THE GRAY IRON FOUNDERS' SOCIETY has removed its head office from Washington to 1010, Public Square Building, Cleveland, Ohio.

CUTTING DOWN COSTS *isn't always easy, but*

hundreds of satisfied users have found that STERNOCORE enables foundry castings to be made to closer limits. This gives more accurate cores, easier working, reduced fettling, quicker drying and faster machine shop production. In short—lower true costs.



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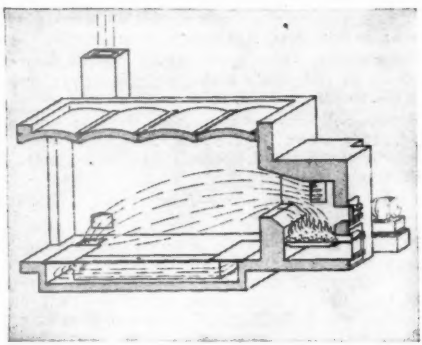

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CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

(Delivered, unless otherwise stated)

December 24, 1946

PIG-IRON

Foundry Iron.—CLEVELAND No. 3: Middlesbrough, £8 9s. 3d.; Birmingham, £8 10s. 3d.; Falkirk, £8 9s. 6d.; Glasgow, £8 12s. 6d.; Manchester, £8 13s. 3d.; DERBYSHIRE No. 3: Birmingham, £8 10s. 3d.; Manchester, £8 13s. 3d.; Sheffield, £8 7s. 9d. NORTHANTS No. 3: Birmingham, £8 7s. 9d.; Manchester, £8 11s. 9d. STAFFS No. 3: Birmingham, £8 10s. 3d.; Manchester, £8 13s. 3d. LINCOLNSHIRE No. 3: Sheffield, £8 7s. 9d.; Birmingham, £8 10s. 3d.

(*No. 1 foundry 5s. above No. 3. No. 4 forge 1s. 6d. below No. 3 for foundries 3s. below for ironworks.*)

Hematite.—Si up to 3 per cent., S & P over 0.03 to 0.05 per cent.: Scotland, N.-E. Coast and West Coast of England, £8 19s.; Sheffield, £9 4s. 6d.; Birmingham, £9 10s. 6d.; Wales (Welsh iron), £8 14s. 6d.; East Coast No. 3 at Birmingham, £9 9s. 6d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £9 1s., delivered Birmingham.

Scotch Iron.—No. 3 foundry, £8 10s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £10 3s.; South Zone, £10 5s. 6d.

Refined Malleable.—North Zone, £10 13s.; South Zone, £10 15s. 6d.

Cold Blast.—South Staffs, £14.

(NOTE.—*Prices of hematite pig-iron, and of foundry and forge iron with a phosphoric content of not less than 0.75 per cent., are subject to a rebate of 5s. per ton.*)

FERRO-ALLOYS

(*Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.*)

Ferro-silicon (5-ton lots).—25 per cent., £21 5s.; 45 per cent., £21 10s.; 75 per cent., £29 15s. Briquettes, £26 per ton.

Ferro-vanadium.—35/50 per cent., 15s. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 5s. 8d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, 1s. 3½d. lb.

Ferro-tungsten.—80/85 per cent., 5s. 8d. lb.

Tungsten Metal Powder.—98/99 per cent., 6s. 4d. lb.

Ferro-chrome.—4/8 per cent. C, £43; max. 2 per cent. C, 1s. 1½d. lb.; max. 1 per cent. C, 1s. 2d. lb.; max. 0.5 per cent. C, 1s. 2½d. lb.

Cobalt.—98/99 per cent., 9s. lb.

Metallic Chromium.—96/98 per cent., 4s. 5d. lb.

Ferro-manganese.—78/98 per cent., £19 10s.

Metallic Manganese.—94/96 per cent., carb.-free, 1s. 9d. lb.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms and Slabs.—BASIC: Soft, u.t., 100-ton lots, £12 17s. 6d.; tested up to 0.25 per cent. C, £13 2s. 6d.; hard (0.42 to 0.60 per cent. C), £14 10s.; silico-manganese, £13 2s. 6d.; free-cutting, £15 12s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £17 2s. 6d.; case-hardening, £18; silico-manganese, £19 2s. 6d.

Billets, Blooms and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £14 10s.; basic, hard, 0.42 to 0.60 per cent. C, £15 7s. 6d.; acid, up to 0.25 per cent. C, £18.

Sheet and Tinplate Bars.—£12 7s. 6d., 6-ton lots.

FINISHED STEEL

[*A rebate of 15s. per ton for steel bars, sections, plates, joists and hoops is obtainable in the home trade under certain conditions.*]

Plates and Sections.—Plates, ship (N.-E. Coast), £17 4s. 6d.; boiler plates (N.-E. Coast), £18 2s.; chequer plates (N.-E. Coast), £18 14s. 6d.; angles, over 4 un. ins., £16 9s. 6d.; tees, over 4 un. ins., £17 9s. 6d.; joists, 3 in. × 3 in. and up, £16 9s. 6d.

Bars, Sheets, etc.—Rounds and squares, 3 in. to 5½ in., £17 9s. 6d. (d/d Midlands); rounds, under 3 in. to ⅜ in. (untested), £18 18s; flats, over 5 in. wide, £16 19s. 6d.; flats, 5 in. wide and under, £18 18s.; rails, heavy, f.o.t., £15 12s.; hoops, £19 13s.; black sheets, 24 g. (4-ton lots), £24 17s. 6d.; galvanised corrugated sheets (4-ton lots), £30 16s.

Tinplates.—I.C. cokes, 20 × 14, per box, 35s., f.o.t. makers' works.

NON-FERROUS METALS

Copper.—Electrolytic, £98; high-grade fire-refined, £97 10s.; fire-refined of not less than 99.7 per cent., £97; ditto, 99.2 per cent., £96 10s.; black hot-rolled wire rods, £89.

Tin.—99 to under 99.75 per cent., £380 10s.; 99.75 to under 99.9 per cent., £382; min. 99.9 per cent., £384.

Zinc.—G.O.B. (foreign) (duty paid), £55; ditto (domestic), £55; "Prime Western," £55; refined and electrolytic, £55 15s.; not less than 99.99 per cent., £57 5s.

Lead.—Good soft pig-lead (foreign) (duty paid), £55; ditto (Empire and domestic), £55; "English," £56 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, ex works, £66 2s. 6d.; rolled zinc (boiler plates), ex works, £64 2s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £56.

Other Metals.—Aluminium, ingots, £72 15s.; antimony, English, 99 per cent., £125; quicksilver, ex warehouse, £20 15s. to £25; nickel, £190 to £195.

Brass.—Solid-drawn tubes, 18d. per lb.; brazed tubes, 21½d.; rods, drawn, 16½d.; rods, extruded or rolled, 12½d.; sheets to 10 w.g., 14½d.; wire, 15½d.; rolled metal, 13½d.; yellow metal rods, 13½d.

Copper Tubes, etc.—Solid-drawn tubes, 17½d. per lb.; brazed tubes, 17½d.; wire, 13½d.

Phosphor Bronze.—Strip, 20d. per lb.; sheets to 10 w.g., 21½d.; wire, 21½d.; rods, 18½d.; tubes, 25½d.; castings, 25d., delivery 3 cwt. free. 10 per cent. phos. cop., £131 10s.; 15 per cent. phos. cop., £137 10s.; phosphor tin (5 per cent.), £425. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 1s. 2d. per lb. (7%) to 1s. 8d. (30%); rolled metal, 3 in. to 9 in. wide, × ·056, 1s. 8d. (7%) to 2s. 2d. (30%); to 12 in. wide, × ·056, 1s. 8½d. to 2s. 2½d.; to 25 in. wide, × ·056, 1s. 10½d. to 2s. 4½d. Spoon and fork metal, unsheared, 1s. 6½d. to 2s. 0½d. Wire, 10g., in coil, 2s. 1d. (10%) to 2s. 7½d. (30%). Special quality turning rod, 10%, 2s.; 15%, 2s. 4d.; 18%, 2s. 8d.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patent)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

580,294 FALLON, J. Conveyor mechanism for furnaces and other apparatus.

580,356 THALEA SOC. ANON. Railway rail joint.

580,389 NORTON & COMPANY, LIMITED, SIR J. F., and NORTON, W. J. Wire-drawing machines.

580,414 CALLITE TUNGSTEN CORPORATION. Porous metallic bodies.

580,478 SOC. NATIONALE DES CHEMINS DE FER FRANCAIS, and DURAND, G. Yielding fishplate for railroad rails.

580,490 BRITISH THOMSON-HOUSTON COMPANY, LIMITED (General Electric Company). Methods of consolidation of powdered metals.

580,667 AUSTIN MOTOR COMPANY, LIMITED, and WALDRON, C. Continuous ovens.

580,688 DU PONT DE NEMOURS & COMPANY, E. I., and DEYRUP, A. J. Eanamel compositions suitable for application to aluminium and aluminium alloys.

580,710 BIRMINGHAM SMALL ARMS COMPANY, LIMITED, WILSDON, S. C., and TURNER, B. Production of powdered metals.

580,728 TUFF-HARD CORPORATION. Heat treatment of high-speed tool steel.

580,744 M-O VALVE COMPANY, LIMITED, and RANSLEY, C. E. Manufacture of wire consisting mainly of nickel.

580,783 WINGET, LIMITED, and DICKINSON, D. P. Rotatable and tiltable furnaces.

580,877 LINDE AIR PRODUCTS. Method of and apparatus for conditioning the surfaces of metal bodies.

580,900 FALLON, J. Heat treatment of cartridge cases. pins, rods, etc.

580,916 SINGER, F. (Lucas, J. M.). Protection of refractory material and metals in contact with molten aluminium.

580,938 BARRETT, W. W., BARRETT, H. A., and RICHARDS, E. J. Casting of metallic pigs or ingots.

580,942 FORD MOTOR COMPANY, LIMITED. Centrifugal casting apparatus.

580,958 GIBBONS BROS., LIMITED, and MARLE, M., VAN. Metal heating tunnel furnaces.

580,976 BUDD INDUCTION HEATING, INC. Heat treatment of metal plates.

581,004 GENERAL ELECTRIC COMPANY, LIMITED, and BLOCH, A. Magnetic or electrostatic separators for ores and similar materials.

581,150 AMERICAN CHAIN & CABLE COMPANY, INC. Metal-working machine.

581,200 SUIJK, J., and SUIJK, K. Process for the vertical casting under centrifugal action of metal bodies.

581,221 WRIGHT, J. A., and METROPOLITAN-VICKERS ELECTRICAL COMPANY, LIMITED. Intermittent seam spot-welding machines.

581,244 WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY. Metal-casting moulds.

581,308 BERK & COMPANY, LIMITED, F. W., and DUGAN, B. B. Manufacture of foundry sands.

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NOTICE

Small Advertisements in this section of the Journal are accepted at the *prepaid* rate of 1/- per line in ordinary type and 2/- per line in capitals. Minimum charge for one insertion 5/-. Box number advertisements 1/- extra. Instructions together with remittance must be received not later than first post on Wednesday for inclusion in Thursday's issue, addressed to the Advertisement Manager, Foundry Trade Journal, 49, Wellington St., London W.C.2.

SITUATIONS

IRON FOUNDRY ASSISTANT FOREMAN wanted for a General Engineering Foundry in East Midlands; casting 30/40 tons per week; must be a keen man of wide experience.—Apply, stating age, experience, and salary required, to Box 832, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

WANTED.—FOREMAN MOULDER, for Foundry in North Midlands; preferably experienced in the production of special pipes for gas and water mains and general engineering castings; good knowledge of loam moulding and loam patterns an advantage; progressive post for right man.—Box 834, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

WORKS / FOUNDRY MANAGER wanted for small Iron Foundry in the North Midlands, producing 20/25 tons per week; state age, experience, and salary required.—Box 830, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

PROGRESS and PLANNING CLERK required by Midland Malleable Foundry; age about 30; prospects of taking over department.—Reply, stating age, experience, references, and salary required, Box 824, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

ASSISTANT FOREMAN required for Foundry in S.W. England; practical experience of machine moulding and cupola essential; particulars of experience, age, and salary required.—Box 826, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

WANTED. — WORKING FOREMAN, for Southern County Iron Foundry; first-class men only need apply.—Box 826, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

REPRESENTATIVE wanted for following districts: London, Southern Counties, Wales, Midlands, North Eastern Counties, for old-established Company manufacturing anti-friction metals, bearings, crankshaft grinding, cylinder block boring, and general engineering, on a commission basis only; only live men with prospects of good results need apply.—Write Box Q.635, JACKSON'S, 16, Gracechurch Street, E.C.3.

SITUATIONS—*Contd.*

TECHNICAL ASSISTANT to General Manager of Foundry making special irons and alloy steels; only men having sound and practical experience in modern foundry practice should apply; a knowledge of modern machine shop practice is desirable; the post is a progressive one, and applications, giving particulars of age, qualifications, experience, references, and some indication of salary required, will be treated in strict confidence.—Box 582, c/o Pool's, Aldwych House, London, W.C.2.

MOULDERS required for non-ferrous engineering castings; also Fine and False Worker for panels and architectural work.—Apply W. A. BAKER & Co., LTD., Newport

PATTERNMAKERS required; steady employment at good rates of pay for first-class men; write or call.—B. LEVY & Co., 1-5, Osbert Street, Vauxhall Bridge Road, Westminster, S.W.1.

URGENTLY REQUIRED, for Southern County Foundry, SEMI-SKILLED and PLATE MOULDERS; preferably single men; good wages to start.—Box 818, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

PATTERNMAKER wanted for Iron Foundry work; to the right man the position offers prospects of advancement to assisting in foundry control; state age, qualifications, full experience, and wages desired.—Box 822, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

AN IRONFOUNDRY IN THE MIDLANDS, who are installing an extensive mechanised development scheme, require immediately a Mechanical Handling and Engineering Draughtsman; applicants should state age, experience, and qualifications.—Box 836, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

MIDLANDS IRON FOUNDRY, manufacturing domestic heating appliances, require a Methods Engineer; capable of designing and developing methods of assembly; progressive position with large organisation; applicants should state age, qualifications, and experience.—Box 840, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

WANTED. — NORTHERN REPRESENTATIVE; Stainless Steel Castings.—Box 838, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

MIDLAND FIRM, manufacturing metallurgical equipment, invite applications for position of Foundry Engineer, having wide experience of steel, grey iron, malleable and non-ferrous foundries in design, mechanisation, sales, etc.; to take responsible charge of department concerned with these products; replies treated in strict confidence; state full particulars, education, age, salary and experience in home and export markets; excellent position for man of proved ability and broad experience in technical and commercial fields.—Box 842, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

BUSINESSES FOR SALE

MODERN Foundry and General Engineering Works in the Midlands; capacity 130 tons per week; freehold premises; approximately 20,000 sq. ft.; price, £120,000, or offer.—Full details of HENRY BUTCHER & Co., 73, Chancery Lane, London, W.C.2.

FOR SALE.—Small Iron Foundry and Manufacturing Business, including two Patents; excellent works; on 7 years' lease; South County.—Box 828, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

PATENT

THE Proprietor of British Patent No. 555,502, entitled "Anchors," offers same for license or otherwise to ensure practical working in Great Britain.—Inquiries to SINGER, EHLERT, STERN & CARLBERG, 28 E. Jackson Blvd., Chicago 4, Illinois, U.S.A.

MACHINERY

WANTED.—Rotary Furnace, 1 or 2 tons; must be in good condition.—Full details, price, and where seen, to E. J. HARRISON, LTD., Edmar Works, Mill Green Road, Mitcham, Surrey.

WANTED.—SAND MIXER; approx. 4 ft. 6 in. pan under drive; single pulley or vee rope, or fast and loose pulleys; new or secondhand, for quick delivery.—RELIANCE, 120, Canal Street, Nottingham.

WANTED.—Overhead Electric Travelling CRANE; 2-3 tons capacity; span 45-65 ft.; cab control; supply, 400-440 volts, 3-phase, 50 cycles.—TARSLAG, LTD., 117, Dunstall Road, Wolverhampton.

WANTED.—Two Cupolas; melting rate 3-4 tons p.h.; complete with blowers; state make, condition, and price.—Box 782, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

WANTED.—One or two Jolt Rollover MOULDING MACHINES; minimum capacity 1,200 lbs.; give details of draw, make, and age.—Box 844, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

MISCELLANEOUS.

August's Portable Core Stove; type C1. Core Stoves, all by Ballard; gas-fired: 4 ft. 3 in. by 5 ft. 4 in. by 7 ft., 2 ft. 10½ in. by 3 ft. 4½ in. by 3 ft. 8 in.; oil-fired: 6 ft. by 2 ft. 7½ in. by 7 ft

Morgan oil-fired Tilting Furnaces; 400/440 lbs.; 5-cwt. and 10-cwt. capacities.

Jackman Foundry Sand Riddle; belt driven.

Electric Vibratory Sand Riddle; 2/50/200 volts

Magnetting Machine; 220 volts d.c.

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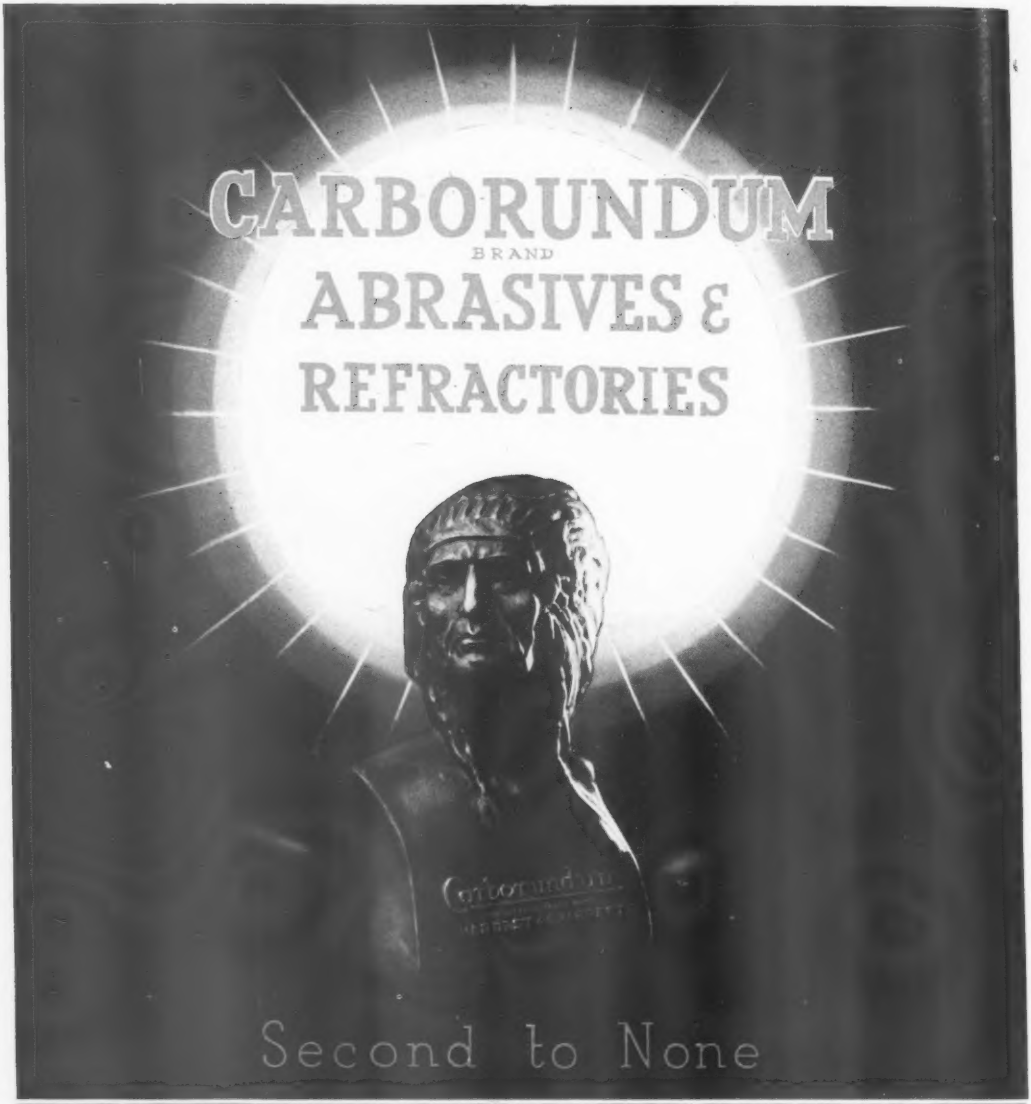

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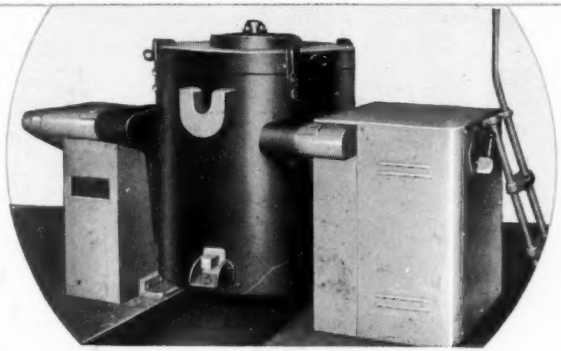

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